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# EDITORIALS

NOTEBOOK NEEDS—Now that our new baby, the NOTEBOOK, has taken its first hesitant step, under the patient guidance of Dr. Guthe, we entertain no doubt that some of its readers will expect it to assume immediately the sturdy, sure stride of an adult, rather than the cautious, uncertain gait of the infant it is. We sincerely hope that it may find its legs and begin to "go places" in short order, but the responsiblity for its growth and usefulness will depend largely upon those of you who are able and willing to contribute toward providing its nourishment.

Inasmuch as material for the NOTEBOOK should reflect the needs of all interested members of the Society, and since the detailed nature of these requirements is but imperfectly understood by the editors, it is primarily important that you should make your needs known. Either Dr. Guthe or your editor will be glad to learn of your desires and ideas. With a clearer conception of what the NOTEBOOK readers expect of it, we can then attack the problem of supplying the demand in a much more intelligent manner.

However, our need of your assistance does not stop there. You, the readers of the NOTEBOOK, to a preponderating extent, are to supply the material for it. Regardless of whether you are specialist or generalist, professional or amateur, many of you have ideas regarding technical methods—the way a given piece of work should be done, based upon sound experience, which you would like to have made available to other students; or which you desire to have criticised by other students—since without criticism there can be no improvement. For example, you may have developed or contributed to a means of mending, restoring, or preserving specimens; cataloguing facts or materials; exhibiting or labeling materials; documenting or collecting field notes; detecting fraudulent objects; classifying types of objects, or the cultures of which they are indicative; or other, similar matter. If your method is superior, it is important that your fellow students have access to it; just as it is important that you have access to the profitable

information which others may contribute. If your method can be improved, it is equally important that you should be able to learn of the improvement. If healthy controversies on method should result, the NOTEBOOK is a proper medium for their widespread circulation.

Or, you may have questions to ask regarding these matters, based upon your own problems and efforts toward their solution. Others may be equipped to solve your problems, as well as to benefit from your solutions to their problems.

In short, you are to contribute your questions and answers, and benefit from those made available by others; the editors are but the supervisors of the clearing house by means of which the exchange of ideas is effected. I hope that I have made it clear that this infant is your baby. The editors merely comprise the staff of nurses and caretakers whose business it is to look after its welfare under your instructions; and now is a good time to begin issuing these instructions.

W. C. M.

# THE MIDWESTERN TAXONOMIC METHOD AS AN AID TO ARCHAEOLOGICAL CULTURE STUDY[346]

W. C. McKern[347]

IN DELAYED response to a certain demand for a published statement covering the archaeological taxonomic method introduced in the northern Mississippi Valley area a few years ago and now tentatively employed in this, the northern Plains, and the Northeastern areas, it seems advisable to briefly set forth in this journal the essential framework for this method, and to include a revision of previously outlined but unpublished discussions relating thereto, in addition to a brief definition of certain problems involved in its application.

Although the present writer's name has been repeatedly associated with this method, it should be made clear that no single individual can be accurately held responsible for the final product. The relatively undeveloped original plan was revised by a self-appointed committee consisting of interested anthropologists representing the universities of Michigan, Chicago, and Illinois, and the Milwaukee Public Museum.[348] A description of the taxonomic method tentatively endorsed by this group was prepared in mimeographed form and distributed[349] for critical inspection to archaeological research students throughout the country. As the result of the constructively critical response to this action, certain details relating to terminology were altered. The general reaction to this revision was one of tentative acceptance, and it was considered the proper procedure to submit the method to trial by use.

At the Indianapolis Conference[350] a change in the terminology for the classificatory divisions was adopted, creating a new division (base) at the generalized end of the frame (as was originally proposed but discarded), and substituting the term "pattern" for "basic-culture." The method as presented here follows the Indianapolis revision.

[346] A revision of the paper: *Certain Culture Classification Problems in Middle Western Archaeology*, presented at the annual meeting of the American Anthropological Association, Central Section, at Indianapolis, 1934.

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[348] S. A. Barrett, Fay-Cooper Cole, Thorne Deuel, James B. Griffin, Carl E. Guthe, A. R. Kelly, and W. C. McKern, meeting at the University of Chicago, December 10, 1932.

[349] Through the facilities of the National Research Council, Committee on State Archaeological Surveys.

[350] Under the auspices of the National Research Council, Committee on State Archaeological Surveys, December 6–8, 1935.

## THE NEED FOR CLASSIFICATION

Any adequate discussion of this or any other method relating to archaeological culture classification must logically follow some consideration of the need for culture classification in archaeology. It may be advanced that we already possess an adequate taxonomic method. I have received such questions as this: why refer to the cultural manifestation of the pre-literate Iowa as the upper Mississippi, or by any name other than Iowa? In instances we may have sufficient data to verify identification with some known historic group, such as the Iowa. However, in most instances, we can not immediately bridge the barrier between pre-literate and historic or protohistoric cultural groups, and in many instances we can not reasonably hope ever to be able to do so. Yet we perceive that there are archaeologically collected data that warrant cultural segregation. The only taxonomic basis for dealing with all cultural manifestations, regardless of occasional direct historical tie-ups, is that of culture type as illustrated by trait-indicative materials and features encountered at former habitation sites. If at any time it becomes possible to name the historic ethnic group for which the pre-literate group is the progenitor, no confusion should result from the statement that, for example, Upper Mississippi Oneota is Chiwere Sioux; no more so than from the statement that *Elephas primigenius* is the mammoth.

Aside from the inadequacy of the direct-historical method to supply the archaeologist in every instance, and immediately, with means for attachment to the ethnological classification, the latter, even if applicable, would not ideally answer the needs of the archaeologist. One ethnological classification divides the aborigines into linguistic stocks, which are subdivided first into more specific linguistic groups and, finally, into socio-political groups. The criteria for classification are social, primarily linguistic. The major portion of the data available to the archaeologist relates to material culture, and in no instance includes linguistic data. Consequently, this ethnological classification does not satisfy archaeological requirements.

It may be said that we have the ethnologically conceived culture areas to supply a basis for archaeological classification. However, these so-called culture areas involve two factors which the archaeologist must disregard in devising his culture classification if he is to avoid hopeless confusion; these are the spatial and temporal factors. First, the culture area attempts to define, or at least limit, geographic distribution. Unfortunately, cultural divisions of American aborigines did

not always succeed in confining themselves within a continuous area, or in keeping culturally pure an area of any important size. Second, the archaeologist considers the American Indians from the standpoint of all time, and, certainly, there can be no cultural areas devised to account for an unlimited temporal factor.

In brief, the archaeologist requires a classification based upon the cultural factor alone; temporal and distributional treatments will follow as accumulating data shall warrant. Moreover, the archaeological classification necessarily must be based upon criteria available to the archaeologist.

Any statement that the archaeologist has no need for a culture taxonomic method is in conflict with facts which all students of the subject must have encountered. One has only to consult the pre-classification reports on research in almost any American province (outside the Southwest, where a special classification has been developed), noting the indefinite use of the word "culture" to denote anything from the manifestation of a general pattern influential over an area a thousand or more miles in extent, to the highly specialized manifestation of a culture apparent at a cluster of closely localized sites, and noting the confusion of unstandardized cultural terminology, to appreciate the need for simplifying the complexity of cultural data and concepts through the establishment of systematic order. In men's affairs, chaos does not reduce itself to order without a plan. The accomplishments of science stand as a monument to planned orderliness.

Unlike the student of ethnology, the American archaeologist has not been appreciably influenced by the initial complexity of his subject to specialize in some certain aspect of that subject; more inclined to embrace in his studies all apparent aspects of his subject within the area available to him for investigation. As his problems lead towards comparative studies over wider area, his conceptions of cultural manifestations take on broader interpretations. Starting with cultural differentiation, he begins to observe evidence of cultural affinities, not only as regards specific complexes but involving distinctive types of complexes. He lacks a specific terminology that is standard with his fellow students, by means of which he can clearly express his maturing concepts. He stretches old meanings to apply to his needs, and finds himself justly criticised, primarily by students limited to ethnological experience, for his extraordinarily indefinite, inaccurate use of the term "culture," which, for want of a more specific term, is made to serve a multitude of specific purposes for which it never was intended.

The point of all this is that the student of archaeology in the greater Mississippi Valley is greatly in need of a standardized culture scheme such as can be realized only through the medium of a taxonomic method.

There are a few who have hesitated to cooperate fully in this classificatory experiment on the grounds of not being satisfied that the time for classification has yet arrived. They perceive that we lack adequate information to warrant wholesale classification. With due respect for the caution exhibited in this attitude, I can not but feel that this caution is based upon a false conception of the very nature and purpose of classification, and a misunderstanding of the intentions of those endorsing the taxonomic method in question.

Classification is nothing more than the process of recognizing classes, each class identified by a complex of characteristics. For many years, we have all been active in this business of identifying cultural classes, no matter by what name one may call it, but we have not performed with marked efficiency because we have lacked the necessary equipment. In the *Encyclopedia Britannica*, Dr. Abraham Wolf says: "Classification is one method, probably the simplest method, of discovering order in the world. . . . In the history of every science classification is the very first method to be employed." We have tried to get along without it over long. It is classification that makes it possible for one student to describe phenomena in terms readily comprehensible to another student versed in the taxonomic method. It reduces a multiplicity of facts to simplicity and order, and supplies a standardized terminology without which students encounter difficulty in conversing intelligently on a common subject.

The adoption and use of a taxonomic method most certainly does not imply the immediate classification of all manifestations with apparent cultural significance. It is only in those instances in which sufficient data are available, quantitatively and qualitatively, to create a problem of cultural differentiation that classification can serve to any advantage. In some provinces little in the way of detailed classification can logically be attempted at this time; in other provinces much can be accomplished towards detailed classification; and in all provinces a taxonomic method should be adopted before any serious attempts are made at classification. Naturally, this method should be standard for the largest area possible. Following an agreement as to method, the actual classification should be a necessarily slow, deliberate procedure, constantly experimental, subject to such major and minor corrections as newly accumu-

lating data may dictate, subject to a maximum of constructive criticism and resulting improvement. Such is the history of any scientific classification. It is the method of classification to be employed, not any specific classification, that offers an immediate, initial problem for which a solution is now being attempted.

## PRELIMINARY TERMINOLOGY

Before describing the taxonomic system, certain details of involved procedure and related terminology should be explained and defined.

The word *determinant* is employed to denote any culture trait when it is ~~and as~~ used as a marker for any specific culture division. The term is in no sense synonymous with "trait."

In comparing any two culture manifestations, it may develop that certain traits are shared in common by the two manifestations. Such traits, to follow Ritchie,[351] may be designated as *linked* traits. Traits found to occur in one manifestation and not in that with which it is compared, peculiar to the one manifestation in this comparison, are termed *diagnostic* traits.[352] It follows, by definition, that in any comparison of two manifestations only diagnostic traits can serve as determinants for either manifestation, since only traits peculiar to each of the compared culture varieties can be used to differentiate between them. It therefore follows that traits which are diagnostic and thus useful as determinants in one comparison may be linked traits in another comparison and, consequently, useless as determinants. Therefore, there can be no truly valuable fixed list of determinants for any given culture class, serving as such in all possible comparisons; the determinants for a hypothetical Culture A as compared with Culture B may be considerably different from the determinants for the same Culture A as compared with Culture C. The term "determinant" can only be employed as applied in a stated comparison.

In brief, all the traits characteristic for a given culture manifestation comprise the culture complex for that manifestation. However, in any comparison of this manifestation with another, made for purposes of classification, certain traits may be demonstrated as present in both complexes, and these linked traits, serving to show cultural similarity between the two culture variants, can not be employed as determinants in this comparison. Certain other traits, respectively peculiar to each

[351] Ritchie, Wm. A., *Culture Influence from Ohio in New York Archaeology*. This series, Vol. 2, No. 3, p. 187, January, 1937.

[352] *Ibid.*

of the compared complexes and so serving to differentiate between them, are diagnostic traits and useful for culture determinants in this comparison. Other comparisons may produce an entirely new alignment of determinants.

## USE OF TRAITS

One of the most difficult problems facing the classifier is that of identifying the determinants for a cultural division, particularly those more specific divisions in which cultural details are important criteria for differentiation. This difficulty is partly due to the difference in complexity between such an object as a simple bone awl and another such as a pottery vessel. Culture criteria available to the archaeologist are demonstrated by culture-indicative materials, for the most part artifacts. A simple type of artifact may serve as one element in a trait complex for one cultural division, and therefore may serve in some comparison as a determinant for that division. This may be the case with a simple type of bone awl. However, when a comparatively complex type of pottery is characteristic for one of the more specific cultural divisions, the question arises as to whether it should be considered as a trait or as comprising a number of trait elements. It certainly is more culturally indicative than a pointed fragment of bone. Single detailed pottery elements, such as shell temper, loop handles, or cord-imprinted decoration, would seem to be at least as important culture markers as a simple implement with a single differentiating trait. Thus, apparently, we may have a considerable variety of trait elements exhibited by pottery alone. Probably other subjects of cultural import in instances will each supply many, rather than a single trait; for instance, mound structure, burial methods, and house types. It may even seem advisable to recognize in the simplest of artifacts such distinct detailed traits as regard shape, material, and technique of fabrication.

The problem, then, narrows down to the selecting, from the traits comprising a complex subject, of those trait details which have sufficient cultural significance to qualify them as culture determinants. This really implies a separate classification of the essential trait elements for any given complex cultural subject. For example, pottery should be classified under such essential heads as paste, temper, texture, hardness, surface, color, shape, and decoration. Determinants in pottery for a cultural division in a specific comparison could then be selected to cover these standard pottery trait elements. In the same way, the essential detailed traits for burial method, and other complex

subjects could be standardized through special classifications, with the result that the determinants for one cultural division would cover the same ground as, and carry similar weight to those for another division with which it is compared. Simpler subjects would offer fewer but equally important trait details, or elements.

Our problem has also to deal with different types of culture, as different from each other as a broad basic type and a local specific type. The former is identified for the most part by traits that are in the nature of fundamental cultural trends. These fundamentals are quite different in character from the detailed material trait elements that are so important in determining highly specialized divisions. Thus, the character of a trait employed as a culture determinant will depend upon the type of cultural division for which it serves as a determinant. The presence of horticulture might serve as a differentiating trait for some sedentary division as distinct from a nomadic, hunting division, but it could not serve to distinguish between two subdivisions of a horticultural class. In the opposite extreme, a peculiar motif in pottery decoration might serve as one determinant of a local specific division, but not as a determinant for the less specialized division under which it is classified, since it is peculiar to the local class.

One general axiom must guide the student in attacking this problem. Traits or trait elements employed as determinants must be characteristic for that division which they serve to identify. That being the case, determinants for a *base* (see following taxonomic system), or even a *pattern*, will be for the most part general in character and relatively few in number. For the more specialized divisions, progressing from lesser to greater specialization, the determinants will be an enriched edition of the determinants for the immediately preceding, more general division, as altered to include greater detail, plus a considerable number of trait elements peculiarly characteristic of the more specialized division. For example, the *focus* determinants would be the *aspect* determinants made richer in detail and augmented by additional traits peculiar to the focus and exhibiting the greatest cultural detail apparent for the entire pattern.

## TAXONOMIC SYSTEM

The method here under consideration is basically a simple one employing for its purposes complexes of cultural factors only. Five arbitrary divisions are made differentiating between specialized local types of culture manifestation and more general and broadly influential types.

*Focus.* Starting at the site, as any investigator must, materials and associated data are collected which have cultural significance. Expressed in terms of culture traits, these data provide a trait complex for the site. If the complex of trait units so determined, or any important complex of trait units included therein, is found to recur in characteristic purity and practical completeness at other sites, to an extent suggestive of cultural identity, this recurring complex establishes the first of our class types, the *focus*. A focus may be briefly defined as that class of culture exhibiting characteristic peculiarities in the finest analysis of cultural detail, and may in instances correspond closely to the local tribe in ethnology. It is dangerous, however, to define it as such.

The manifestation of any given focus at a specific site is termed a *component* of that focus. This is in no sense an additional type of culture manifestation, one of the five class types; rather, it is the focus as represented at a site, and serves to distinguish between a site, which may bear evidence of several cultural occupations, each foreign to the other, and a single specified manifestation at a site. In many instances several components, each at cultural variance with the other, may be found to occur at a single site.

*Aspect.* A comparison of established foci may supply evidence that certain foci are, on the one hand, very like each other, especially when certain of the more specific trait units are eliminated from consideration, and on the other hand, as a group, show marked dissimilarity to other compared foci. When this similarity of compared foci involves a preponderating majority of the traits and trait elements, the dissimilarity apparent for the greater part in considering the more detailed elements, these foci may be classified under the same *aspect*, the second class type. All foci in a given aspect share the somewhat less specific aspect trait units, but possess additional peculiarities in fine cultural detail. Thus, the type of decorative pattern on pottery might serve as an aspect determinant, shared by all the foci in that aspect, whereas the actual patterns employed might serve to differentiate one of these foci from another.

*Phase.* Similarly, like aspects may determine a *phase*, the third class type. As the classifier approaches the more generalized classes, cultural detail becomes less important to his purposes, and the traits that are shared by all aspects within the phase to make up the phase complex take on a more general character. For example, whereas actual decorative patterns on pottery may serve as focus determinants, and

less specific types of pattern decoration as aspect determinants, the trait of mechanical technique for ceramic ornamentation, shared by all its aspects, might be the most detailed trait of pottery decoration applicable to the phase. Or, the phase may be characterized by a general burial procedure, general pottery attributes, and general house-type features; whereas one aspect within the phase is differentiated from the other aspects as the result of a consideration of burials, pottery, and houses in somewhat greater detail. In addition to this qualitative factor, a near majority of traits shared in common by compared aspects determine the phase, and these traits comprise the phase complex. As previously demonstrated, it should be remembered that there is a difference between the phase complex, or any other class complex, and the complex of determinants for the phase as specifically compared with another phase.

*Pattern.* Several phases may be shown to share a small complex of broadly general traits, in contrast to other compared phases in which these traits do not occur. Such a complex of traits determines that the phases identified thereby bear the relation to each other of belonging to the same *pattern*, the fourth class in the taxonomic frame. The traits used as determinants for the pattern will be such as deal with the cultural reflection of the primary adjustments of peoples to environment, as modified by tradition.

For example, the Mississippi Pattern, as compared with the Woodland Pattern, offers such determinants as (tentative list): characteristic extended inhumation; a pottery ware medium to fine in texture, prevailingly shell-tempered, characterized by incised, trailed or modeled decoration, offering relative variety in shape; basically triangular chipped-stone projectile points; secondary flaking superimportant over primary, to reduce thin flakes to a desired shape and size; ungrooved axes; relative superimportance of bone, antler, and shell as materials for a considerable variety of artifacts; sedentary territorial adjustment.

The Woodland Pattern, as compared with the Mississippi Pattern, offers such determinants as (tentative list): characteristic flexed inhumation and/or secondary interments; a pottery ware characteristically grit-tempered, granular in structure, with intaglio surface ornamentation effected on the soft unfired paste by means of cords and/or other indenting tools, prevailingly sub-conoidal in shape with simple shape variety; stemmed or notched chipped-stone projectile points and cutting implements; primary chipping superimportant over secondary,

to reduce thick flakes to a desired size and shape; grooved axes; semi-sedentary territorial adjustment.

*Base.* In addition to the diagnostic traits respectively employed as determinants for these two patterns, there are also certain broadly general linked traits shared by both; such as pottery, sedentary tendency, and, possibly, horticulture. On a basis of these similarities, if these patterns are compared, for example, with nomadic hunting patterns, the Mississippi and Woodland patterns may be classified together within the same *base*, the most general of the taxonomic divisions. The base is characterized by a few fundamentals, such as relate in the most general way to the food quest (horticulture, hunting, seed gathering), community order (camps, permanent villages), or possession of classes of products of outstanding cultural import (pottery, basketry). Hypothetical examples of the base might include such descriptively named divisions as: Horticultural-Pottery Base; Nomadic-Hunting Base; Sedentary-Fishing Base; Seed-Gathering-Basketry Base.

To summarize briefly, the taxonomic frame consists of five major divisions: focus, aspect, phase, pattern, and base, progressing from localized detailed to large general classes. The manifestation of a focus at any site is called a component of that focus. The method is comparable to a filing cabinet equipped with labeled drawers to facilitate the orderly arrangement of culture-indicative data.

## RELATED PROBLEMS

Archaeological data at best offer a very incomplete cultural picture of the people under investigation, and great care should be taken to base classification upon as representative a mass of data as possible. The exploration of a burial site has been demonstrated in many instances to produce information more characteristic of the burial customs of an ethnic group than of the complete culture. Similarly, data collected at a village site with no burials is deficient in that information on burial methods is lacking.

The error in classifying cultural divisions on a basis of site or component units, regardless of the limitations in character of such manifestations, i.e., whether burial, village, or other varieties of sites, may be corrected by a consideration of *communities* rather than components. This method of approach has been advanced by Cole and Deuel,[353]

[353] Cole, Fay-Cooper, and Deuel, Thorne, *Rediscovering Illinois*. University of Chicago Publications in Anthropology, pp. 34, 278, University of Chicago Press, 1937.

who define the community as " . . . the complete cultural manifestation of a local group or as much of it as is determined by archaeological exploration." Any classification based, for example, on data collected exclusively at burial sites is subject to greater error, and is therefore less useful than if the determinants represent a community as manifested at both habitation and burial sites.

Experience seems to demonstrate that absolute mathematical percentages in trait similarity can not be successfully employed to establish the class relationship between two compared manifestations. This is largely due to the fact that a completed list of culture-indicative data for any culture group can never be made available, and that such lists as are available will be more inclusive for one community than for another with which it is compared. Moreover, the different character of the culture elements employed for determining separate classes, i.e., the generalized traits of a pattern as contrasted to the detailed trait units of a focus, serves to complicate any mathematical treatment of the problem; it is difficult to add apples and bushels of apples.

However, the quantitative similarity in culture indicators is decidedly serviceable in determining the classificatory place of a manifestation. After trait units for a community have been formulated as the result of field and laboratory research, and this trait list is compared with similarly prepared lists for other manifestations, it may be found that, culturally, the community complex is more similar to certain of the compared manifestations than to others. If the similarity should amount to a practical identity of these detailed trait elements, a focus would be indicated. If the similarity should amount to an important majority of the trait elements, at least aspect relationship would be indicated. Similarly, a comparison on a basis of more generalized traits in all probability would serve to identify pattern, possibly phase relationships.

It is not to be expected that a complete classification for any given work province can be made immediately. Classification will grow slowly under the most favorable conditions, and, in instances, will be delayed indefinitely. In all instances, the taxonomic method should be regarded as a tool to be used only when needed.

The growth of a classification will not invariably be in logical sequence, from focus to base. After a focus has been determined, the classifier may fail for a time to find evidence of near cultural relationship and, lacking criteria indicating the proper aspect, or even phase, may assign the focus to a pattern before data indicative of the inter-

vening classes are made available; providing, of course, that the pattern complex has previously been defined.

The relative grouping of cultural divisions by any such taxonomic method does not necessarily imply evolutionary relationship. A common historical origin may be suggested, but the implication should be considered as an indicator, guiding further research, rather than as proof in itself. Cultural evolution can not be established by such a classification since time criteria, so essential to any study of directional growth, have no place in its determination; the method makes use of culture criteria only. A chronology independently constructed from available time criteria may later be determined as a parallel development and correlated with a culture classification to establish or refute evolutionary sequence.

Cultural distribution can only be portrayed on a basis of time, since distribution is not a fixed quantity for all time. Thus, any map devised to show the known distribution for a given culture division, such as the Upper Mississippi Phase, is a map of culture only; for any given time, it might offer a materially altered appearance.

In applying any taxonomic method, there is always the danger that an unleashed enthusiasm may induce the classifier to attempt to make the facts fit the method. The lure of being methodical at all costs is a constant threat to the wholly profitable use of any method. It is well to bear constantly in mind the rule that the classification is, and forever must be, subservient to the facts. It is convenience and orderliness in handling archaeological data that is required of the classification, not a flawless, natural regimentation of the facts required by the classification.

This method of classification is arbitrary, like all other scientific taxonomic methods. Under the blending influences of diffusion, and the divergent tendencies involving cultural growth by invention, there can be no hard and fast natural division lines. This absence of sharp lines of demarcation between classes applies rather equally to the subject matter of all natural sciences, and can not be advanced as a valid argument against classification. Our method is not nearly so arbitrary as the division of a continent into culture areas, which disregards an inelastic temporal factor and a confusingly mixed and unstable distributional factor. The maximum degree of arbitrariness in our method is attained in the division of cultural manifestations into five, rather than some other number of culture types. The five divisions were finally agreed upon by the authors of this method as satisfying all apparent

needs for major subdivision. With the means provided for ultimate subclassification into specific groups under these culture-type heads, if and when needed, the major requirements of remotely separate fields seem to be satisfied, as reported by specialists in those fields.

Although the space available here has not permitted for the taxonomic method adequate illustrations by example, it is hoped that the basic idea has been stated clearly, and that some of the most essential problems relating thereto have been defined. Admittedly, the value of such a method, and the ways for making it function to best advantage as discussed herein, are controversial subjects. However, in consideration of experience obtained as the result of a rather widespread trial of the method, during the last six years, it appears to have contributed materially towards introducing order into the previously existing chaotic status of general culture concepts throughout the greater Mississippi Valley.

# THE MATERIAL CULTURE OF KINISHBA

GORDON C. BALDWIN[354]

## INTRODUCTION

THE architecture and burials of the prehistoric pueblo of Kinishba have been presented in a previous issue of AMERICAN ANTIQUITY.[355] The present article is a preliminary report of the lesser objects of material culture as represented by the pottery, stone and bone implements, ornaments, a few charred fragments of basketry and textiles, food, and ceremonial objects. The majority of these specimens are made from imperishable material. Clothing, sandals, baskets, various types of textiles, wooden implements, and other perishable materials have but a very short existence in open sites such as Kinishba. Hence the following description of the artifacts presents only a limited picture of the arts and crafts of these prehistoric people.

Kinishba is a large compact pueblo situated in the White River Valley in east central Arizona on the Whiteriver Apache Indian Reservation. From tree-ring dates it has been determined that it was occupied from about 1150 to 1320 A.D., thus belonging to Pueblo III—the Great Pueblo Period, and the early part of Pueblo IV—the Regressive Pueblo Period. This large pueblo has been partially excavated and restored during the past seven summers by the Arizona State Museum and the Department of Archaeology of the University of Arizona.

## POTTERY

The ceramic industry at Kinishba was very highly developed, the pottery vessels secured consisting of the excellent forms typical of the Great Pueblo Period of culture. Almost all of the vessels were manufactured by the coiled process, with only a very few small pieces, evidently the product of children, suggesting the molded method. The pottery vessels may be divided into two classes, plain and decorated. The plain consists of corrugated vessels, either red or grayish-black in color, and plain red or reddish-brown types, some having a burnished black interior. The decorated class includes: black-on-white; black-on-red; Pinto, Gila, and Tonto polychromes; St. Johns, Pinedale, and Four-mile polychromes; Jeddito Black-on-yellow; and several other types represented mainly by sherds.

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[354] Assistant Director, Arizona State Museum, Tucson, Arizona.

[355] Vol. 4, No. 1, pp. 11–21.

As most of these types have previously been described,[356] only certain of the outstanding characteristics or peculiarities of the pottery will be considered here. The corrugated wares consist entirely of medium to large ollas, the exterior coils being treated in a great variety of ways. The corrugated type and the plain red, being the chief utility vessels, are the most common wares at Kinishba. The plain red type occurs in both bowl and jar forms. Bowls range from five to fifteen inches in diameter, with an incurving, beveled rim. The vessels are quite often slipped and often highly polished as well. These types have so far not been named.

In the decorated types, there are a great many variations from those described for other ruins in the area. Black-on-white existed throughout the life of the pueblo, but changed from bowl forms in the early to large jar forms in the late. The earlier black-on-white seems to have been closely connected with the early Chaco and Little Colorado black-on-white types to the east and north, while the later black-on-white is quite similar to that from Pinedale and Showlow pueblos to the north,[357] combining both Roosevelt and Tularosa black-on-white traits. Black-on-red likewise occurred from early to late, but was strongest during the 12th and 13th centuries. The black-on-red types are similar to the Little Colorado polychromes but lack the white paint. Decoration was confined to the interior of bowls in a quartered or all-over style of hatched and solid designs. However, many of the later pieces have additional decoration on the exterior, either as isolated single elements or as a continuous band design placed just below the rim. The black paint on the later black-on-white and black-on-red types is often glazed.

Polychromes, however, were the most abundant of the decorated types, Pinto, Gila, Tonto, and Fourmile polychromes being the most common. Pinto Polychrome has a black-on-white interior and a plain red exterior. Gila Polychrome commonly has the same combination of colors, but the designs are much more elaborate, employing the broken life line and usually covering the entire interior surface. Tonto Polychrome (Plate 15, Figure 1) has a black-on-white interior and also a black, white, and red exterior design; some have a plain red interior, and either a black, white, and red exterior or a band of black-on-white just below the rim, with the remainder of the exterior slipped red. The

[356] Baldwin, 1937, pp. 1–4.

[357] Haury and Hargrave, 1931, pp. 27–28, 62–64.

Gila and Tonto forms quite often have an outcurving rim. These three types are characteristic of the Pueblo culture which invaded the Hohokam area in the Tonto and Gila basins from about 1200 to 1400 A.D.[358] The Pinto was the earliest, later being replaced by the Gila and Tonto forms which spread on to the west into the Gila Basin proper. Fourmile Polychrome (Plate 15, Figure 2) utilizes a black-and-white-on-red design on both the interior and exterior, and is a comparatively late type, ranging from about 1325 to 1400 A.D.[359] There were a great many variations of this type, including combinations of Fourmile with Pinto and Gila polychromes, Fourmile designs in white on plain red vessels, and black interior bowls with Fourmile exteriors.[360] There was also a new type derived from Fourmile Polychrome; this unnamed variety has a buff slip and decoration on both the interior and exterior in black and red, and occasionally white. This same type was found by Haury at Canyon Creek to the west of Kinishba,[361] and the writer has picked up several sherds at Grasshopper Ruin to the northwest. It seems to be a very late type as it is associated with late Fourmile, Jeddito Black-on-yellow, and early Zuni glazes, probably coming in during the last quarter of the 14th century. The earlier Little Colorado polychromes, the St. Johns[362] and Pinedale[363] types, were also prevalent, the St. Johns having a black-on-red interior and a white-on-red exterior, and the Pinedale a similar interior arrangement with a black-and-white-on-red exterior.

Besides these types, which were all made at Kinishba, there were a number of other types representing trade wares. These include Jeddito Black-on-yellow, the Old Hopi ware from the north, numerous examples of the Hawikuh or Old Zuni series, green glaze on white, black and green glaze on white, black outlined with purple on white, and black and red on white, and a few red-on-buff sherds from the Hohokam area to the southwest, showing that Kinishba had a great many trade connections with other areas.

## ADDITIONAL CLAY OBJECTS

There were a number of other objects made from clay. These included scrapers, round flat disks, and prayer stick bases. Scrapers were

[358] Gladwin, 1930, pp. 4–9.
[359] Haury and Hargrave, 1931, pp. 31–42.
[360] For other variations see Haury, 1934, pp. 128–131.
[361] *Ibid.*, pp. 135–137.
[362] Gladwin, 1931, pp. 36–40.
[363] Haury and Hargrave, 1931, pp. 64–68.

FIG. 1.—Tonto Polychrome types.

FIG. 2.—Fourmile Polychrome types.

FIG. 1.—Stone axes.

FIG. 2.—Arrow-shaft smoothers.

made from a fragment of broken vessel, either oval or circular in shape, with one or more edges showing use in scraping and smoothing, probably in the manufacture of pottery. The round flat disks were also made from broken vessels and were quite common. The purpose of these is not known. Those with perforations through the center may have been used as spindle whorls, as buttons at the end of spindle shafts to keep the thread from slipping off, or as buttons fastened to clothing.[364] Those lacking the hole through the center may represent unfinished whorls or buttons, or they may have been used as gaming counters. Prayer stick bases consist of small round pieces of clay with a hole in the top in which the upright shaft of the prayer stick rested.

## STONE IMPLEMENTS

Tools, implements, utensils, and weapons made from stone were particularly numerous. Stone was used in the manufacture of metates and manos, mortars and bowls, rubbing and polishing stones, axes, hammers, arrow-shaft smoothers, hoes, jar covers, paint palettes, arrow and spear points, knives, scrapers, and drills.[365]

Metates were of two types, a flat and a grooved variety. Most were of the flat type, only a comparatively few being grooved. They were generally made of malapai, lava rock, although a number were manufactured from sandstone or granite. They measured seventeen inches in length, twelve inches in width, and from two to six inches in thickness, the latter depending upon the amount of usage. This type was used in the mealing bins. The second type had a groove about nine inches in width and several inches in depth running the full length of the metate. This was the portable type, generally being set up on three rocks and slanted forward at an angle, the raised sides preventing the meal from spilling. The grooved type is the earlier form, being replaced by the flat type during the Great Pueblo Period. The manos or hand stones used with these metates were generally of the flat rectangular type. A few triangular and diamond-shaped forms occurred. The usual form consisted of a rectangular slab of lava rock, about nine by four by two inches, with rounded edges, and was commonly used on one side only. Occasionally there were hand holds pecked in on one or both sides as aids in grasping the mano. Small flat metates were used for grinding paint.

Stone mortars, consisting of circular or oval blocks of malapai with

[364] Roberts, 1932, p. 133.

[365] Most of the stone materials were identified by Robert E. Heineman, Mineralogist, Arizona Bureau of Mines. This was a hand specimen identification only.

a round depression in the center, were not very common. Stone bowls, made either of granite or of malapai, were rectangular in shape with a rectangular depression at the top.

Almost all of the stone axes were of the three-quarter grooved form (Plate 16, Figure 1), only a few of the full-grooved type occurring. The former generally have a comparatively long cutting blade while the completely grooved form has an extremely short blade. These axes were made of diorite or diabase and were usually rather highly smoothed and polished. They ranged from three to ten inches in length. Several double-bitted axes with either a three-quarter or full groove also occurred; these were usually made of serpentine. The long, three-quarter grooved, highly polished axe is typical of the southern or Hohokam area, while the shorter, rougher, full-grooved type is characteristic of the northern or Pueblo area. Mauls and hammers were made from malapai, sandstone, or diorite. The flat tabular type had a single striking surface and a three-quarter groove; a second form had a groove completely encircling the stone in the center and a rounded striking surface at either end.

Arrow-shaft polishers were very common. These are rectangular, or sometimes circular stones, generally of basalt or serpentine, with from one to five or more grooves on one side (Plate 16, Figure 2). They are supposed to have been used in shaping and smoothing the shafts of arrows, and may also have been utilized for smoothing and polishing beads. Those from Kinishba were usually very carefully finished and often ornamented with an incised or raised decoration in simple lines on one or both ends. Rubbing and polishing stones were particularly numerous. Rubbing stones were of malapai, similar to the manos although only about half their size. Polishing stones were circular or oval in form, made of limestone, and ranged in size from small pebbles used to polish pottery to large ones five or six inches in diameter. Olla covers consisted of thin circular disks of sandstone from six to ten inches in diameter. Stone hoes were generally made of thin sheets of basalt five to ten inches in length and two to five inches in breadth, one side being chipped down to a rather good edge. Most of these seem to have been used in the hand, only a few having notches indicating that they had been hafted. Only one complete slate tablet was found, but fragments of others occurred. These were rectangular in form, carefully smoothed and polished, with a raised border around the edge. This border often was decorated with a series of short, parallel, incised lines. These slate tablets were probably used as paint palettes and are characteristic of the Hohokam culture in the Gila Basin.

Chipped and flaked implements include arrow and spear points, knives, scrapers, and drills. The materials used were chert, chalcedony, and obsidian. The typical form of arrowpoint has a rather long narrow blade with a concave base, having neither tang nor notches. The notched forms are much shorter, with the notches set at right angles to the axis of the blade. A few have serrated edges. Only a few spear points were found, and most or all of them might perhaps be considered as knife blades. Of the two main types, one has a long, rather narrow blade with a short tang, while the other has a broader blade and no tang, with only a slight tapering at the base for hafting. Knives are quite similar to spear points, but as a rule broader and with longer blades. Scrapers are small to medium-sized flakes of chert with one or more edges chipped down to an even edge that could serve for scraping or cutting. Drills have a long, almost circular shaft and a broad flat base; they range from one and one-half to two and one-half inches in length. One small round stone ball with a hole one-half inch in depth in one side was probably used as a rest for the end of a drill shaft.

## BONE AND HORN IMPLEMENTS

The bone and horn implements are of particular interest because they show the kinds of animals present at that time, and illustrate as well the types of tools themselves. The animal bones found in this connection include those of the deer, rabbit, wolf, fox, and wildcat; the only bird bones are those of the turkey, although a number of macaw skeletons in burials show that this bird was undoubtedly used as a pet and as a source for feathers. The types of implements comprise awls, needles, daggers, fleshing tools, punches, chisels, arrow-straighteners, and whistles.

Awls were usually made from the long bones of the deer, although a number were made from turkey and rabbit bones. Carefully shaped and polished specimens were common. Many were made from deer ulnae, the condyles and olecranon processes furnishing a natural handle. Some of the more slender awls no doubt served as needles. Daggers are longer than awls, usually being made from the whole bone. Some have a perforation at the basal end.

Fleshing tools, scrapers, or chisels were generally made from deer horn or from certain long bones of the deer, particularly the humerus. The end is commonly flat, with a beveled edge. Horn flakers, pieces of deer horn with a rounded point, were used in flint-working. Punches were made from deer horn or from small deer bones, usually having a rather dull point. Sections of deer horn with a series of small round

drilled perforations averaging three-eighths of an inch in diameter, probably functioned as arrow-shaft straighteners or polishers. Short tubes of bone with a single hole in one side served as whistles or turkey calls.

## ORNAMENTS

Ornaments were particularly numerous in the collections from Kinishba, coming largely from burials. Stone, including diorite, flint, slate, steatite, argillite, gypsum, calcite, and turquoise, was the chief material. Shell was also extensively employed, the chief types being *Glycymeris*, *Olivella*, *Conus*, *Haliotis*, *Pecten*, and *Turritella*. Bone was used to a very limited extent.

Beads were made of stone, shell, and bone, those of stone being the most common. Stone beads were all of the flat tubular type, and were black, white, or red in color. Only a few turquoise beads were found. Shell beads were of two types, a flat circular form cut from the side wall, and the whole shell perforated at one end. The latter, the more common type, was made of *Olivella*, *Conus*, and *Glycymeris* shells. Bone beads were of turkey bone cut into thin sections and polished. These various types of beads were commonly strung on cords as necklaces, one such necklace measuring nine feet.

Pendants were very abundant. Stone pendants were made of calcite, gypsum, argillite,[266] or turquoise, and were round, square, or rectangular in shape, ranging from one-half to two inches in length and about the same in breadth. In a cache in one room, 1140 gypsum pendants were recovered. These varied considerably both in size and shape. They may have been strung on a cord as a necklace, as traces of yucca cord still remained in several, or they may have been fastened to a shirt or some other article of clothing. Pendants of shell were numerous, usually consisting of a *Glycymeris* shell with a hole drilled at the top. *Conus*, *Olivella*, and *Turritella* shells were also used as pendants, either serving as individual pieces or suspended from the center of a bead necklace. Small pieces of *Haliotis* and other shells, as well as stone and bone, were also carved in the shape of birds and animals and used as pendants. One large clam shell had an inlay on the outer surface consisting of 367 small pieces of cut turquoise, with a rectangular piece of red shell in the center.

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[266] This argillite is colored red with iron oxide, and probably came from the Mazatzal Mountains to the west of Kinishba along the Verde where similar deposits occur.

Bracelets, aside from those formed of strands of beads, were not very common. They were made of round sections cut from clam and *Glycymeris* shells, with the knob or beak often being left on for added decoration. A number of rings made of thin sections of bone also occurred. A single peculiarly shaped object, much like the lip-plugs of Mexico, was found in the secondary patio. It was made from green soapstone and had a small hole drilled through the plug part.

## TEXTILES

This part of the material culture of the people of Kinishba is represented by only a few small specimens. The few examples that were obtained were either in the form of charred fragments or in clay impressions of the material. Thus it is not possible to give a very detailed description of this phase of the culture.

The varieties of textiles included specimens of baskets, matting, and cloth. One clay impression of a basket showed a diagonal or twilled weave in what appeared to be yucca leaves. The specimen does not show the rim and there is no way of telling whether or not it had a reinforcing rod at the top. A charred fragment of a basket showed a similar twilled weave.

A number of fragments of matting were found. The material used was either yucca leaves or tule, the latter perhaps being the more common of the two. These were twilled, woven in over-three-under-three pattern. Several specimens were found with burials and perhaps indicated that the body had been wrapped in a mat before burial.

The examples of cotton cloth recovered exhibited several different weaves. The usual form was the simple over-one-under-one in plain weave. A second had a diagonal braid that may have been used for girdles or belts, and a third specimen showed a twilled pattern in over-two-under-two.

## FOOD

Large quantities of corn and beans were found in several storage rooms that had been destroyed by fire. The corn is a small flint type, with very small, hard kernels. The cobs are comparatively short, averaging about two and one-half to three inches in length. The rows of kernels on each ear varied from eight to twelve. There were at least two different types of beans, one a rather small variety and the other a large black or red kidney bean. Several squash seeds were also found. The presence of a number of walnuts and the remains of a store of what appear to be choke cherries demonstrate that these people also gathered

wild products to supplement their own agricultural efforts. The numerous remains of animal and bird bones in the rooms and in the refuse heaps show that they relied upon hunting for a good deal of their food supply.

## CEREMONIAL OBJECTS

Ceremonial objects commonly include all those articles to which a definite utilitarian purpose cannot be assigned. Those from Kinishba include painted stones, painted deer bones, quartz crystals, bear claws, and worked stone objects. A single stone pipe is also described here, as it was probably used ceremonially.

A number of rectangular and oval stones, both large and small, were painted on one side in orange, red, yellow, black, or white. One stone tablet had a geometric design in orange and black, another a radiating design in four colors, black, red, yellow, and white, and a third a circle with radiating lines in red. Objects of painted deer bone occurred still more often than those of stone. These usually consisted of a part, or the whole of the jawbone with the teeth still in place. One consisted of the posterior part of the right mandible, with a red circle with radiating lines painted at the angle of the ramus, and evidence of some additional decoration in red on the front portion. Another represented the right mandible with broad stripes of orange running across the bone on the exterior side, and a small circle in orange near the back. A third showed a portion of the maxilla painted in red, black, and yellow lines, while a fourth consisted of the left mandible with broad stripes of green on one side.

Natural six-sided quartz crystals, either rough or smooth and regular, were no doubt used as charms or ceremonial objects. Three perforated bear claws were uncovered in the main patio and possibly represent some sort of ceremonial object. Several worked stone objects of problematical nature may be considered as ceremonial. One of these was a rectangular slab of sandstone measuring twenty-two and one-half by twelve inches, with a small hole drilled through near the top.

A single stone pipe was recovered during the excavation. It was made from a dark green stone, probably serpentine, tubular in shape, and four inches in length.

## CONCLUSIONS

This article is a very condensed report of the work so far accomplished at Kinishba. There are still several seasons' work remaining

before the project will be completed, so that no final conclusions will be drawn until that time, when it is hoped to publish a detailed account of the excavations.

Kinishba is to date the only site in the Upper Salt area that has been thoroughly excavated. There have been a number of surface surveys conducted but no detailed work has been done. Showlow Ruin to the north and Grasshopper Ruin and Canyon Creek cliff dwellings to the west are the nearest excavated sites. Because of Kinishba's peripheral position, situated as it is about midway between the known areas of the Anasazi and Hohokam cultures, it was thought that its excavation would throw much needed light on the relationships between these two cultures. Later, when the Mogollon culture was defined, it was found to be about equidistant from the areas of all three cultures. So far Kinishba seems to conform quite closely to the pattern of those pueblos located to the north of the Mogollon Rim in the southern part of the Little Colorado area, as Showlow, Pinedale, Fourmile, and others. However, certain of the pottery types may, upon further study, be traced back to a Mogollon ancestry, and the presence of cremations and red-on-buff sherds point to Hohokam influence in the area. It may be that in the earlier part of the pueblo, or in the small house and pithouse sites nearby, more definite evidence of relationship can be determined.

However, the excavations have shown that a number of the Little Colorado pottery types that have generally been considered as originating and developing largely in that area probably developed in the region to the south of the Mogollon Rim.[367] At Kinishba and, as far as the writer knows, at Kinishba alone can certain pottery types be traced in a direct sequence from early to late. This development or evolutionary series runs from early black-on-red through late black-on-red and Pinedale Polychrome to Fourmile Polychrome, including many late and specialized types of the latter. All the intermediate stages in the development from early black-on-red to late black-on-red, from late black-on-red to Pinedale, and from Pinedale to Fourmile are present, giving a continuous sequence in this red ware from pre-1200 to 1400 A.D. The development of glazed paint can also be traced in this series. Glaze has been considered to have been a Little Colorado development, spreading from there to the Rio Grande and other areas where it has

[367] Haury has recently suggested this for Fourmile Polychrome; see Haury, 1934, pp. 128–131.

been encountered.[368] However, if those pottery types upon which it is most frequently found originated south of the Rim in the Upper Salt, there is no logical conclusion other than that glaze developed there also. The presence of Pinto, Gila, and Tonto polychromes in great abundance and in great diversity of form demonstrates that these types had a very long life at this pueblo. Considering the fact that this ware is believed to have developed out of a Little Colorado black-on-red type, there is again a strong basis for the belief that Kinishba may have been the birthplace of this ware. A similar development for black-on-white ware can also be traced at this site, including the use of black glaze paint on white vessels. All of this would logically lead to the conclusion that Kinishba was the center for a number of developments in pottery making in the Upper Salt and Little Colorado area.

Kinishba is one of the largest sites, if not the largest, in the Upper Salt area. A number of larger sites have been reported to the south of the White River, but these seem to be somewhat earlier. Certainly Kinishba seems to be the largest continuously occupied pueblo in the area in question. Including the pithouse and small house ruins in part underlying the main pueblo, we have an occupation from approximately 900 to 1400 A.D., or about 500 years of development. During almost the whole of this period Kinishba was undoubtedly increasing in size, reaching its peak about 1350. Thus, with additions of outlying groups, particularly of groups from other areas, there would naturally be numerous changes in pottery styles, just such changes as took place in the development from black-on-red to Pinedale to Fourmile Polychrome. Pinedale, Fourmile, and Showlow, those pueblos to the north of the Rim where these types are found in abundance and where they have been considered to have originated, do not present the continuous occupation that Kinishba does and consequently would have been less likely to have originated and developed pottery types such as these.

With regard to the other cultural elements manifested at Kinishba, these seem to be a blend of Hohokam and Anasazi traits, with the latter, however, strongly in the majority. So far few elements can be definitely traced to a Mogollon ancestry. The flat metate type which is dominant at Kinishba is definitely Pueblo, while the stone axes show a blend of both Hohokam and Anasazi, with the three-quarter grooved Hohokam type preponderant, although the northern Pueblo influence can be seen in the shortness of the blade. Olla covers are very common

[368] Haury, 1932, pp. 418–425.

in the north, but stone hoes and slate tablets are characteristic of the Hohokam culture to the south. The prevalence of bone implements indicates a northern ancestry also. The practice of inhumation is of course characteristic of the Anasazi culture, although the presence of several cremations shows that this Hohokam custom was not unknown here. Architecturally, Kinishba is very definitely a typical pueblo.

As to Kinishba's position with relation to the Anasazi, Hohokam, and Mogollon cultures, it might not be out of place to introduce a few comments.[369] Recent work in the Hohokam and Mogollon areas by Gila Pueblo has demonstrated that both of these cultures may be more ancient than the Anasazi or Basket Maker-Pueblo in the north, and consequently at least in part ancestral to it. While it can be admitted that the Mogollon and Hohokam cultures were basic in the Southwest, the Anasazi or Pueblo culture can very easily be proven to have been the dominant culture. Wherever the Pueblo culture has come in contact with either of the other two, it has been the one to survive practically unchanged. In the Mogollon area in southwestern New Mexico, the Mogollon complex was dominant through the Georgetown, San Francisco, and Three Circle phases, but, during the latter phase, the Pueblos began to enter the area, and the resulting Mimbres phase was largely Pueblo in outline. This is particularly shown by the skeletal remains, the Pueblo type replacing the earlier Mogollon low-vaulted type.[369a] The later Animas phase in this area is also Pueblo in pattern. In the Hohokam area in the Gila Basin, the Salado culture, a Pueblo culture from the Little Colorado, or probably from the Upper Salt, moved in about 1250 or 1300 A.D., practically dominated the area for one hundred or more years, and then departed. The Salado or Pueblo culture, and not the Hohokam, was responsible for the large multiple-storied structures built during this period, and it was during this time that irrigation was brought to its peak. We have no knowledge of what happened to the Hohokam during the ensuing 140 years until de Niza and Coronado came through the area in 1539–40, but certainly they did not possess as highly developed a culture as they had previously. At least they seem to have made but very little impression on the Spaniards, and were totally ignored by them for more than a century. In the Chihuahua area likewise, the Mogollon culture is thought to have been basic in the development, but again the Pueblo culture swept in and

[369] This report was written in 1937, and certain of the comments made here should be modified in the light of recent discoveries.

[369a] Haury, 1936, pp. 112–115.

overshadowed it. The only Pueblo area to have been affected by the Hohokam culture seems to be the Flagstaff area. However, this district is considered to be somewhat peripheral to the Anasazi area, the Hohokam influence is only strong in the earlier periods, and the later development is largely Pueblo. The same is true along the Little Colorado to the east where the Mogollon influence enters in the early periods but not in the later.

The Mogollon and Hohokam cultures may have been earlier but certainly the Anasazi cultures exerted more direct influence and dominated over a greater part of the Southwestern area. The Pueblo area was considerably larger than either of the other two, extending from northern Utah and western Colorado to the Mogollon Rim, and even south of that into central Arizona, and from eastern Nevada to the eastern border of New Mexico.[370] The Hohokam culture was largely confined to the Gila Basin in southern Arizona, although it extended over most of southern Arizona, and the Mogollon culture was restricted to the southwestern corner of New Mexico and southeastern Arizona, being absorbed, however, by the Pueblo culture about 1000 A.D.

In 1540, when we get our first written records of the area, the Mogollon culture as such had been gone for 400 years; the Hohokam seemed to lie in the background, resting upon its past achievements; and the Anasazi alone was the one to be flourishing much as it was during the Great Pueblo Period. The reason for the great decline in the Pueblo area, the later concentration into restricted areas, may be accounted for by increased pressure by nomads to the north and east.

In conclusion, Kinishba itself is a long-occupied site situated about midway between these three areas, and yet it is basically, fundamentally, and essentially a typical Anasazi pueblo. There undoubtedly was Mogollon influence in the earlier periods, and possibly Hohokam also, but certainly the later development, at least that from about 1000 to 1400 A.D. was dominantly Pueblo, exhibiting the characteristic Pueblo traits of compact pueblos with stone masonry, ceremonial rooms, corrugated pottery, and black-on-white ware.

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# THE MACON TRADING POST, AN HISTORICAL FOUNDLING

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EXPLORATIONS on the Ocmulgee River, near Macon, Georgia, carried out over a period of four years under the sponsorship of the Smithsonian Institution and the National Park Service, and under the auspices of the successive relief agencies of CWA, FERA, WPA, and CCC, have uncovered many remarkable finds and discoveries, many of which will be permanently restored or exhibited in the development of Ocmulgee National Monument, established by Act of Congress in 1934.

The first scientific announcements concerning the Ocmulgee explorations have served to fix the Macon sites in the minds of lay readers interested in American archaeology as an important center of Southeastern prehistory. Thick accumulations of cultural deposits, superimposed house floors and platforms belonging to the successive occupations of different prehistoric groups, have afforded stratigraphic and typological evidences on which to base a chronological scheme for the tracing of cultural developments in central Georgia. In places the stratified remains at Macon attained a total depth of ten feet, exclusive of superimposed building levels in associated mounds which show further superimposition of stratified remains.

Altogether a vast accumulation of field data and collections has been made which indicates from differing archaeological contexts that there have been no less than four major periods of cultural development in the area, representing the remains of peoples who had a diversified civilization characterized by agriculture, pottery-making, and mound-building.

The precise differences in material life represented in these arbitrary cultural divisions are not as yet completely worked out. There are signs that the major mile posts in the past of central Georgia will show perceptible variations in culture pattern which may permit of further subdivisions as additional exploration and comparative studies are made.

Archaeology and history have long been recognized as closely related studies. History records man's past as preserved in documentary

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form; archaeology unfolds the picture of the more obscure and remote passages of human experience as preserved in the material remains of man's past life. In recent years there has been a broadening conception of what might be considered historical evidence, and much data not of purely documentary form have come to be recognized as historically significant in reconstructing past events and cultural relationships. The work at Macon has given fresh demonstration of this increasingly closer relationship between history and archaeology in presenting a series of explored sites which fit demonstrably into a chronological series culminating in the more recent documented period of early European contact with the American Indian.

Individual spans in the bridge of history are frequently absent, or present only in attenuated form, in the series available at a single site. These gaps or lacunae may have several possible explanations. They are a caution to the careful student of prehistory not to yield to any simple, unilateral conception of historical development implying the germination, growth by normal stages, and efflorescence of civilization on his restricted site. Important implications of the spatial distribution of related culture traits over larger areas; the time element required for diffusion of ideas and habits; factors of ecology and geography as well as those of human psychology; all must be considered before a plausible reconstruction can be reached. No more protean expression of the synthetic methods of science exists than that exhibited in archaeological field work on a complex site.

Frequently the most difficult link to forge in the chain is that which binds the prehistoric to the historic. In an effort to obtain as complete a picture as possible of the life of the American Indian, ethnologists have combined many facts taken from living informants with data gleaned from accounts left by the first Europeans to come in contact with the aborigines of this continent. Today archaeologists and ethnologists are beginning to work together in seeking the entering wedge which will enable us to proceed from the documented historic period to the older, more obscure, prehistoric phases.

Their labors thus far, it must be confessed, have not been very productive. The cultural peculiarities of particular tribes or groups of related Indians living in a limited area, as described by the ethnologists, have in only a few instances been thoroughly covered in specific site situations by the archaeologists. In general, the archaeologists have made only sporadic investigations of villages and mounds ascribed to historic tribes on documentary evidence. Their attention has been

drawn more frequently to evidences of habitation which on investigation have shown no historic indications. This preoccupation with the more remote, and seemingly more glamorous past may partly explain the failure of archaeologists to work effectively with ethnologists in attacking the more difficult problems of prehistory. And this, despite the fact that the more logical approach would be one which followed established lines of investigation in the mathematical sciences—to accept the geometrical principle of proceeding from the known to the unknown.

At the Macon site this gap in chronological sequence has been filled to complete satisfaction by the discovery of an historic trading post in conjunction with a large settlement built around the post by friendly Indians. The Trading Post was found on the west edge of the Macon Plateau facing toward the Ocmulgee River one-half mile away. The ground plan of the structure was indicated by an enclosure or ditch filled with dark, disturbed, partially water-laid sand and clay. The ditch was about two and one-half feet deep and eighteen to twenty inches wide. It extended in a continuous sweep, except for two breaks on the west side, to enclose an area bounded by five symmetrical sides. The ditch indicated the line of a stockade wall, constructed of horizontally laid, and probably pegged, logs (Plate 17, Figure 1). The two openings toward the west were gates or entrances, one large and one small.

The plan of the structure resembled the end and gable of a house. One side 140 feet long, faced the river to the west; two shorter sides, each forty feet long, made obtuse angles with the remaining two sides, each 100 feet long, that formed the "gable" at the eastern end of the stockaded area. Inside the ditch which indicated the old stockade were dark linear molds where log cabins had been built and had decayed.

Another unusual and interesting feature was the discovery of distinct traces of an old trail breaking through the top crust of the plateau and terminating at a point in front of the gates to the Trading Post. This trail, uncovered in vertical cross-sections made through the plateau at intervals of fifty to one hundred feet, had been followed for nearly a mile across the plateau from the northeast by the archaeological crews before the Trading Post site was discovered. Beyond the entrances through the broad front of the stockade the beaten path ran southwest toward a river crossing. The plan of the Trading Post and the restored trend of the trail came out with such obvious relation that the workmen engaged in uncovering these features would not have been

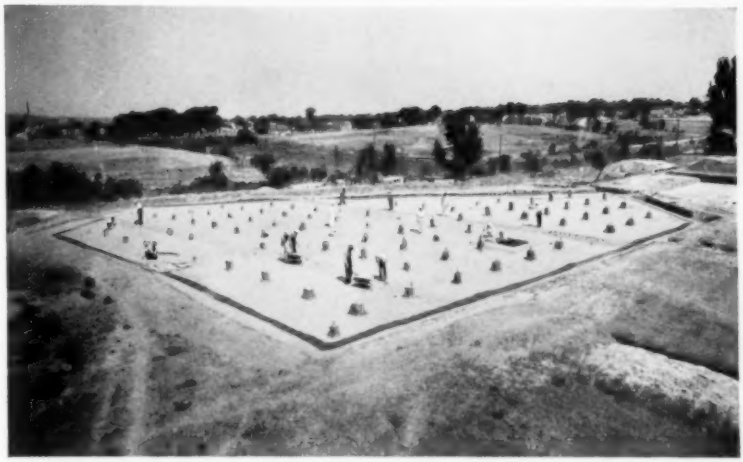

FIG. 1.—The five-sided log wall or stockade of the Trading Post, indicated by the darker soil. The small columns of soil left standing under the survey stations indicate how much overburden was peeled off to uncover the groundplan. In the right foreground three men are troweling out a burial found inside the stockade. Taken before excavations exposing the surrounding ditch had been made.

FIG. 2.—A section of the ditch or moat-like extension as brought out after removal of fill on the east side of the Trading Post enclosure. The small pit-like excavations in the fore-ground were filled with refuse and midden. The sites of Indian lodges as shown by post moulds in conjunction.

FIG. 1.—A robust adult male skeleton with a girdle of copper bells (hawkbells) found in place in the pelvis. The 17th century copper bells were trade objects, probably secured from the Spanish in Florida. The suggested use of the bells as dance rattles gave to this individual the popular designation, "The Jazz Man."

FIG. 2.—A flexed burial of an adult male Indian with a long-barreled, flint-lock pistol showing in place above the left arm. Two brass buckles and two buttons with a covering of copper strands were additional finds.

unduly suspicious had the archaeological supervisors uncovered a series of post moulds and indicated them to be hitching posts.

A perplexing problem in exploration arose incident to the discovery of a broad sloping ditch found to parallel the line of the stockade on four sides. About fifteen feet wide and averaging two and one-half to three feet deep, with gently sloping shoulder margins, this ditch followed an unbroken course around all sides of the stockaded enclosure except for the steeper bluff face of the plateau immediately in front of the Trading Post. Regarded as a whole, the encompassing ditch had the appearance of a shallow moat set at a distance of approximately twenty feet from the wall stockade and serving to protect the approach to the Trading Post on four sides (Plate 17, Figure 2).

The difficulty in accepting the moat theory lay in the shallow, relatively narrow limits of the ditch. It could hardly have offered any effective obstruction to the rush of attackers. A dark, mucky, bluish clay deposit in the basal deposits of the ditch implied the former presence of quiet or stagnant waters in which clay sediments had been laid down around lush vegetation. This fact might support the idea of a moat were it not for the shallow depth and the incompleteness of the parallel excavation.

Another interpretation of the ditch around the Trading Post was to regard this depression as a borrow pit extending around the four walls, the source from which dirt was taken to build up an earth platform inside the pegged log wall stockade. If this view be accepted, then one must remark the regularity and planned consistency with which the soil was taken in uniform quantities from points equidistant from the stockade.

Whatever the purpose, there could be no doubt but that the parallel ditch belonged to and was an integral part of the Trading Post structure. This conclusion was demonstrated further by the finding of historic Indian burials and refuse pits made into the base and lower shoulder margins of the ditch (Plate 18).

In contrast to the war-like accoutrements of his fellows, one robust male had been laid out in the grave gayly bedecked with a wreath of twenty-four large copper hawkbells strung around his waist as dance rattles. A cluster of lead balls, probably carried in a skin pouch, found in place by his side, struck a discordant note (Plate 18, Figure 1). An ebullient news reporter viewing this unusual burial promptly and gleefully dubbed him the "Jazz Man," somewhat to the indignation of the anthropologically-minded field director who objected to the introduction of such unseemly modernity.

Presence of Indian graves, cooking pots, midden heaps accumulated *in situ*, both inside and outside the stockade, gave conclusive evidence that the same people had lived on the site before, during, and after the building of the Trading Post. Some of these habitation signs were intrusive into the line of the stockade ditch. It was not likely that the Europeans who built and used the stockade would permit Indians to live inside, certainly not to bury their dead within the walls. Association of European material in these various situations gave the clue that trade continued after the Trading Post was destroyed or abandoned.

Moreover, other village occupations at the foot of the bluffs on which the Trading Post was built showed the same pottery and native artifacts possessed by the friendly Indians who lived at the Post, but without the presence of European trade objects. These village remains, consisting of thick beds of wood ash and midden, were covered over with three feet of water-laid sand and soil creep derived from the slope of the plateau. The soil mantle over the ash beds did contain trade objects. Here we had archaeological data implying the presence of the same Indians on the spot not only before the Trading Post was established but at some time before they came in contact with Europeans.

Such are the archaeological facts. What light can history throw upon the problem? Identification of many of the European objects points consistently to a date between 1680–1718. A Spanish coin and a brass scale pan weight stamped 1712 have helped materially in the dating.

In his title the author has dubbed the Macon Trading Post as "an historical foundling." The reason for such a designation is apparent. Before the establishment of Ft. Hawkins on the Ocmulgee in 1806 as the westernmost outpost of the American Government, little is known of central Georgia history. This is the "Debatable Period" in which Spain, England, and France contended for the southeastern territory. The Trading Post is indicated as belonging to that interval.

The suggestion has been made that the Macon Trading Post was established by traders from Carolina late in the 17th century and that it was probably destroyed incident to or following the Yamasee Wars of 1715. The historical significance of the site is enhanced by the probability that Colonel James Moore came to this spot on the Ocmulgee in 1704 in company with fifty Carolinians, that he concentrated 1,000 Creek Indian warriors on the meadow behind the Trading Post, armed them, and proceeded to Florida where he defeated a large force of Spanish and Appalachi Indians in the Appalachi country.

The Trading Post exploration presents a reversal of the usual situa-

tion which obtains where both historical and archaeological research are involved. Ordinarily the archaeologist sets out with a more or less complete written record provided by the historian describing the site, with all buildings and structures, and the events leading up to and following construction. The archaeological job usually consists of uncovering remaining physical evidences of conditions once faithfully drawn in some detail when the originals were outstanding. In the case of the Macon Trading Post, no specific historical documentation relating to the existence of such a post is at present known, except for vague references. Colonel Moore's march, his concentration of Creek Indian fighting men, the Ocmulgee rendezvous, are blank pages in history. Before archaeological exploration began there was no knowledge in the possession of the best informed scholars as to the historical presence of a fortified place on the Ocmulgee, near the present site of Macon, antedating the establishment of Ft. Hawkins in the first decade of the 19th century. Had there been such understanding, it would have been possible to follow the trading path, uncovered in earlier exploration, to the very gates of the stockaded post.

Thus are the close relationship and interdependence of history and archaeology again strikingly exemplified. By a happy coincidence archaeological investigation has recovered a lost fragment of Georgia history. Now the historians must delve into many forgotten, unpublished, probably uncatalogued documents of the period to obtain specific information with which to identify the fragment and fit it in its proper historical perspective in the "Debatable Period."

The importance of the find for history may be better understood when it is considered that Moore's conquest of the Appalachi Country and decisive defeat of the Spanish was a turning point in the struggle between Spain and England for the southeastern territory. For archaeology, in central Georgia, the discovery is of even greater significance. The entering wedge into the proto-historic and prehistoric complex is provided. The mists of legendary accounts of folk origins begin to be dispelled. For the first time it becomes possible to apply specifically data from ethnology and history which previously had only general application.

# A POTTERY VESSEL FROM KODIAK ISLAND, ALASKA

FREDERICA DE LAGUNA[372]

IN FEBRUARY, 1938, the Washington State Museum at the University of Washington, Seattle, acquired on loan a remarkable pottery vessel from Kodiak Island, southwestern Alaska. It is with the kind permission of the Director, Dr. Erna Gunther, that I publish the following pictures and description (Plates 19–20).

The pot is owned by Mr. James Spears of Seattle, and was found by local Eskimo on or near Three Saints Bay, on the southeastern shore of the island. It had apparently fallen out of a dirt bank in a recent landslide. Mr. Spears did not notice any trace of shells or other midden material in the bank, nor any indication of old house sites in the vicinity. No other objects were found with the pot.

The vessel was complete when it came into Mr. Spears' hands. The bottom was knocked out by an incautious friend, but since the fragments were saved, it would be possible to restore the vessel. The scaling off of the surface around the lower half of the pot was caused either by cooking or by the action of organic acids in the soil where it was buried. Although this injury to some extent disfigures the vessel, it fortunately permits us to examine the composition of the walls (Plate 20, Figure 1-a).

The specimen stands 31 cm. high; the diameter at the mouth is 21.5 cm., at the bulge or shoulder about 25.5 cm., and at the bottom it must have been about 9 cm. The widest part of the bulge is 12 cm. from the top. The vessel wall is roughly 1.4 cm. thick, flaring to 1.7 cm. at the top of the flat rim. The pot was undoubtedly used for cooking, since there are incrustations of food on the inside and traces of soot outside. The color of the surface varies from buff to dark gray or black. Where the interior of the wall is exposed, we see first a layer of bright brick red just below the surface, and a buff layer beyond that. The surface is quite hard, and the vessel seems to have been well fired. It is, in fact, the finest example of Eskimo pottery that I have ever seen. The surface has been scraped smooth, probably with a wet tool which forced all the tempering material into the body of the wall and spread smooth clay over it. There is no evidence of a true slip, however.

The temper consists of extraordinarily coarse, angular, flattened pebbles, ranging up to fifteen millimeters in length, of the sort that

[372] Bryn Mawr College, Bryn Mawr, Pennsylvania.

Cooking pot, Three Saints Bay, Kodiak Island, southwestern Alaska. Scale in centimeters.

*a* *b*

FIG. 1.—*a*, Detail of cooking pot, Three Saints Bay, Kodiak Island. Scale in centimeters. *b*, Detail of the underside of a paddle-decorated lamp, probably Birnirk or post-Birnirk culture, northeastern Siberia. Scale in centimeters. (Washington State Museum, 10049.)

*a* *b*

FIG. 2.—Prehistoric Tena pottery from House 13, New Grayling, Yukon River near Anvik, Alaska, Scale in centimeters. *a*, Fragment of cooking pot. (University of Pennsylvania Museum 35-21-182.) *b*, Restored cooking pot. (University of Pennsylvania Museum, 35-21-187.)

might be picked up on a beach protected by a bar from the full action of the waves, or that might be found along a stream that was reworking moraine gravel. There is no evidence that artificially crushed rock was used, and I could find no trace of organic temper, such as hair, grass, or feathers. Since it was impossible to make a petrographic analysis, I cannot state positively that no organic material was included. The pot may have been smeared with fat or oil before firing, but again I cannot say whether or not this was done. An exaggerated amount of gravel temper was used, the individual pebbles packed close together and lying for the most part parallel to the surface; a circumstance which has encouraged the natural tendency towards exfoliation. The paste itself is rather crumbly.

It is hard to say exactly how the vessel was constructed. The flat bottom was undoubtedly made as a separate piece, to which the walls were added, and it is along this line of junction that the pot has broken. Neither the way in which the vessel has split, nor the surface finish, offers any suggestion of coiling. Slight depressions and bulges on the inside suggest the use of paddle and anvil, though the scraping on the outside would have obliterated any paddle marks. This vessel resembles rather closely the Tena (Athabaskan) and Eskimo pots which I found on the Yukon,[373] and so I assume that, like them, it was built up by patch modeling.

The Kodiak pot is unique, for though sherds and even whole vessels may possibly have found their way from Kodiak to museums in Russia or this country, to my knowledge no description of them has ever been published. I have been told that vessels of unbaked clay were found on the island, but from the description I should judge these to have been really storage pits lined with clay, and not movable pots at all. It is rather surprising that pottery, and especially that such good pottery, should have been made on Kodiak Island, since examples of native pottery from the Aleut-Pacific Eskimo area are so rare that they can literally be counted on the fingers of one hand. That this pot was actually made by the Kodiak Eskimo we need not question, since the reports of the early Russian explorers have prepared us for the discovery of such an object. Thus, in 1772–1773, the natives of Kodiak had "clay and wooden vessels."[374] Pallas, in the report of Bragin's expedition to Kodiak in 1776, mentions "earthen and wooden vessels," and in the report of Shelekof's voyage in 1783–1787, mentions "utensils

[373] de Laguna, 1936, p. 11. The final report on this work is in preparation.

[374] Zolotarev, p. 17.

of wood, of the horn of the wild ram [possibly mountain sheep from the mainland], of clay, and of hollowed-out stone."[375] Khvostoff and Davydoff, who visited Kodiak in 1802–1808, reported that: "From clay they make fire-pots, in which they melt whale fat. Formerly they could also bake pots, but now that art is lost, possibly for the reason that they find our kettles more convenient." Krasheninnikoff also reports that the Kodiak Eskimo cooked meat in clay pots.[376]

Let us examine the finds of pottery in the area surrounding Kodiak Island. On Atka Island, one of the more remote of the Aleutian Islands, Jochelson found " . . . half of an unbaked clay lamp, which fell to pieces when touched. This was the only trace of Aleut pottery."[377] Dall had previously found on the same island a lamp "carved from unbaked clay,"[378] but as I have already pointed out this could hardly be called pottery because it was carved, not molded or modeled.[379] Jochelson says that the Aleut lacked pottery "possibly as a result of the absence of clay."[380] As to whether suitable clay is actually lacking on the Aleutian Islands I have no means of judging.[381] At the ancient site at Hot Springs, Port Möller, on the Alaska Peninsula (probably Eskimo, but in any case near the Aleut boundary), Weyer found " . . . a single specimen of baked clay . . . It was a nondescript fragment, no larger than a thimble, of red, sandy clay, which may have been baked."[382] Finally, I found two fragments of what was probably a lamp in the uppermost layers of the Eskimo site on Yukon Island, Kachemak Bay, Cook Inlet.[383] This deposit represents the last stage of Eskimo culture in that area, just prior to the Tanaina (Athabaskan) invasion. The sherds were from a large vessel, so roughly smoothed that the tempering material, coarse sand or gravel, is visible on the surface. The amount of temper seems excessive, the ware is crumbly and not very hard, with

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[375] Pallas, Vol. 7, Part 12, p. 315; and Vol. 6, Part 7, p. 199. Coxe (Vol. 2, p. 296) translates the second passage as: "utensils of wood, clay, stone and of the horns of wild rein-deer."

[376] Jochelson, 1905–1908, p. 632, footnote 4.

[377] Jochelson, 1925, p. 28.

[378] Dall, p. 80 and Fig. 15021.

[379] de Laguna, 1934, p. 177, footnote 183.

[380] Jochelson, 1925, p. 122.

[381] Jochelson mentions, however, "a layer of yellow clay" under a site on Atka Island (p. 29), and "a layer of brownish clay," or "primeval soil, clayey earth" on Umnak Island (p. 36).

[382] Weyer, p. 263.

[383] de Laguna, 1934, p. 68, Plate 29, Figure 1.

a laminated structure which makes it split off in thin layers parallel to the surface. It has been slightly baked, but perhaps not intentionally. The ware appears quite similar to that found by Van Valin at Birnirk sites near Point Barrow,[384] and may also be compared to that of the Kodiak specimen.

These examples exhaust the finds of Eskimo and Aleut pottery in the vicinity of Kodiak Island. Captain Jacobsen did some digging at an abandoned Indian site on Kachemak Bay, which he calls Soonroodna, and which represented the Eskimo-influenced culture of the local Tanaina Indians just prior to (?) and just after the coming of the Russians. Although I have not been able to identify the site, I think it is probably the one which I visited in China Poot Bay, in spite of the fact that I did not find any pottery there.[385] In both the upper and lower layers, Jacobsen found " . . . a number of small pieces of earthenware cooking pots, of the same kind that are now used on the Yukon."[386] He had previously visited the Eskimo and Indians on the Yukon, and had bought some Tena Indian pottery cooking vessels and lamps at Anvik on the lower Yukon. In view of the rather close relationship between the Tanaina of Cook Inlet and the Tena of the Yukon (especially the lower Tena or Ingalik), it is not surprising that the pottery made by the two groups should have been similar.

Dr. Birket-Smith and I found no pottery in the Chugach Eskimo sites on Prince William Sound, but were told by an Eskimo woman that beads and little toy animal figures used to be modeled out of clay, though they were not fired. The Eyak Indians (Na-Déné), who live in the delta region of the Copper River, just east of Prince William Sound, gave us no information about pottery, but Colonel Abercrombie, who visited them in 1884, said that he had seen them smoking tobacco in home-made clay pipes.[387] It is of course possible that the pipes were made in imitation of Russian ones, but even that does not imply that the Eyak did not have some aboriginal knowledge of pottery. One would suppose that the Prince William Sound Eskimo made true pottery on occasion, just as did their close relatives in Kachemak Bay, and that it was only bad luck that we failed to find any trace of it in Chugach sites. The Eyak might have learned the art from their Eskimo neighbors, but in any case, pottery did not spread farther down the Northwest

[384] Mason, p. 386. Both Collins and I have examined the specimens.
[385] de Laguna, 1934, p. 21 f.
[386] Jacobsen, p. 372. Cf. Osgood, p. 77 f.
[387] de Laguna, 1937, p. 67 f.; Birket-Smith and de Laguna, p. 76 f.

Coast. The four or five pipes that Abercrombie saw were small, with elbow-shaped bowls and wooden stems. The ware was of clay mixed with sand, crudely fashioned, and imperfectly fired. The color ranged from dark blue to yellow, and was different on the two sides, showing that the pipe bowl had been dried or baked beside an open fire.

If we are to find pottery with which this Kodiak vessel may be adequately compared, we shall have to go farther afield, and as already indicated, similar specimens can be cited from the Yukon, Kuskokwim, and Togiak (a small river just southeast of the Kuskokwim). The Eskimo of this region, with whom we should also class those living on Norton Sound, all made pottery, and so did the Tena of the Yukon—that is, all of the Yukon Athabaskans below the Kutchin, and including the Indians of the lower Tanana.[388] I lack information about the Indians of the upper Koyukuk and the Kuskokwim. While there are variations between individual specimens, the pottery of this large area forms one general class with which the Kodiak specimen can be compared. The Yukon Indian pottery, with which I am most familiar (Plate 20, Figure 2), exhibits the same tall, roughly cylindrical shape and flat bottom as the Kodiak pot, the chief difference being that the bottom of the Yukon pots is wider in proportion, while the mouth is still wider than the bulging shoulder. A few vessels are straight-sided and lack the shoulder and neck. As far as size and shape are concerned, the Kodiak pot offers no real contrast to the range found in pottery from Norton Sound to Bristol Bay.

While some of the specimens which I collected on the Yukon were tempered with sand or gravel alone, it was more common to find both sand and small feathers. Although the sand or gravel was sometimes coarse, there was no specimen with pebbles as large as those in the Kodiak pot. The Togiak and Kuskokwim Eskimo pottery in the Peabody Museum at Harvard has sand temper to which there have been added what may possibly be feathers and leaves. A petrographic analysis made by Mr. Donald Horton of the University of Pennsylvania shows that variations of tempering in the Yukon sherds are only of local character.

The pottery in this area (Norton Sound, Yukon and Kuskokwim Rivers) was built up by hand modeling and patching, the bottom being a separate piece which was easily broken out. It is doubtful whether the pieces used for patching were long enough and applied in a sufficiently

[388] A recent letter from Dr. Froelich G. Rainey, of the University of Alaska, Fairbanks, informs me that pottery occurred on the lower, but not on the upper Tanana. Rainey, 1939, p. 376 f. states that it was tempered with bear's hair and shaped by hand.

regular way to justify the term "coiling," although Nelson's description of the manufacture of pottery at St. Michael in Norton Sound would suggest true coiling.[389] The vessels seem to have been shaped with a paddle and a smooth pebble as an anvil, and were generally smoothed off or wiped with a scraper. In many cases, however, this finish did not push the tempering material out of sight. The vessels vary greatly in the degree to which they have been fired, and the surface may, in consequence, be quite hard or quite soft. The interior of the wall is generally somewhat crumbly, and shows a marked tendency to split into thin layers. The color ranges from tan or light gray, through various reddish browns, to black, and the interior of the wall is generally darker than the exterior. My Indian informants said that oil was either mixed with the clay at the beginning, or was smeared over the pot before firing, and was afterwards rubbed on the finished pot at frequent intervals. Almost all the vessels, especially on the lower part of the Yukon, were decorated on the shoulder and neck with lines and dots pressed in with a stick. None of those which I found had been decorated with a paddle or stamp, or with fabric or string impressions.

This Yukon-Kuskokwim group, with which we must class the Kodiak specimen, differs to some extent (especially in shape and decoration) from the pottery found farther north in Alaska. The petrographic analyses made by Mr. Horton of my Yukon pottery and of Birnirk culture sherds from Point Barrow show certain differences, but the significance of these cannot be evaluated without comparative analyses of material from other sites and other periods. We are perhaps dealing only with sub-types of what is essentially a common, though variable Eskimo ware.

Collins' excavations on St. Lawrence Island have shown that pottery belongs to the oldest Alaskan Eskimo culture, the Old Bering Sea culture. This pottery was tempered either with coarse gravel or grass, never with both, was imperfectly fired, and exhibited a tendency to crumble and flake off in layers. It was built up by "molding directly from the clay" (only one sherd showed coiling),[390] and was finished off with a paddle sometimes scored across with lines.[391] One sherd was

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[389] Nelson, p. 210. This pottery was tempered with marsh grass and fine volcanic sand. The top may be left plain or scalloped with the fingers, and incised decorations may be added to the sides. It was baked inside and out for an hour or two in an open fire. Mathiassen (1927, Vol. 2, p. 106) suggests that the coiling here is due to Indian influence.

[390] Collins, 1937a, p. 167 ff.

[391] Collins, 1937a, Plate 47, Figure 17.

check-stamped.[392] The pottery of the subsequent Punuk period differed only in lacking grass temper and in having relatively fewer paddle-marked pieces.[393] The cooking pots of both periods were roughly cylindrical, with steep sides and rounded, very rarely flat, bottoms.[394] Vessels of the same shape were made at Point Barrow at least as far back as the Birnirk stage, a culture closely related to that of the Old Bering Sea period farther south, in part contemporaneous with it, in part with the early Punuk. The Birnirk pottery is tempered with coarse sand and gravel and a slight admixture of feathers. Some of the pottery paddles used in northern Alaska and Siberia during this period were elaborately carved ivory implements with graceful patterns of concentric ovals and spirals.[395] The type of finish produced is illustrated by a lamp fragment from the Siberian Eskimo (Plate 20, Figure 1-b). Other pottery paddles were plain.[396] No incised decorations have been reported from northern Alaska.

The Thule culture, which we know best from its sites in Arctic Canada, is a further development of the northern Alaskan Birnirk phase. In Alaska the local Thule culture seems to be contemporaneous with the Punuk.[397] Thule pottery is naturally very closely related to that of the parent Old Bering Sea and Birnirk cultures. A few sherds found at Repulse Bay and King William Land were from vessels modeled by hand. The ware is gravel-tempered, crumbly, inclined to flake off in thin layers, and was not properly fired. The flaking may possibly indicate the use of a paddle, although there are no paddle marks.[398] Pottery was, however, as unimportant to the Canadian Thule Eskimo as it was to the Kachemak Bay Eskimo, and its place was taken by soapstone vessels. The Thule immigrants from Alaska to Canada may have been encouraged to substitute stone for pottery by the example of the Dorset Eskimo, who made all their pots and lamps of stone, never of clay. This Dorset Eskimo culture is still very poorly known and its origin is shrouded in mystery. It seems to have spread

[392] Collins, 1937a, Fig. 17.

[393] Collins, 1937a, p. 238.

[394] Collins, 1937a, p. 346.

[395] A specimen of this type from Point Barrow (Birnirk culture) and a similar one from East Cape, Siberia, are in the University Museum in Philadelphia. A magnificent specimen from northern Alaska (undated) is in the Peabody Museum of Harvard.

[396] This type is represented by undated paddles in the Washington State Museum at the University of Washington.

[397] Collins, 1937b, p. 66.

[398] Mathiassen, 1927, Vol. 1, p. 66, Plate 27, Fig. 1–3; and p. 318, Plate 84, Fig. 12.

along the Atlantic coast regions from Newfoundland to Ellesmereland and northern Greenland, and was in part earlier than the Thule culture, in part contemporaneous and even extinguished or absorbed by it.[399] In any case, when a group of Thule Eskimo returned from Canada to northern Alaska they carried back with them a preference for the stone lamps and pots that they had known in the east, and where they did not actually import eastern stone vessels, they copied the shapes of these in pottery. Thus the modern style pot on St. Lawrence Island, " . . . flat-bottomed, rectangular in shape, with suspension lugs or holes in the rim—is an entirely different form [from that of the older periods], which makes its appearance at about the close of the Punuk period . . . [and] is a pottery imitation of a soapstone vessel."[400]

The ware of recent and modern Alaskan pottery can, however, be traced back to that of the earlier periods. Thus Murdoch, in describing recent sherds from Point Barrow, says that the Eskimo told him that such pottery was made of "earth (nu'na) bear's blood, and feathers." The sherds seem to have been baked, and look to me as if they had been paddled.[401] Stefánsson describes the pottery of Kotzebue Sound as made of clay, sand and ptarmigan feathers; it was shaped with a paddle, the hand used as an anvil, and was dried, not baked, by the fire.[402] On the Kobuck River the temper was sand or crushed rock and grass.[403] The sherds which he found at abandoned sites in the Franklin Bay region, east of the Mackenzie, were tempered with crushed rock.[404] Modern St. Lawrence Island pottery is made of clay which naturally contains beach gravel. This is modeled by hand, baked, then smeared with blood, and this ware can be traced back through the protohistoric period to the Punuk.[405] Thus, if we disregard the shapes, both modern and ancient Alaskan pottery belong to the same tradition.

This hasty review will show that while Eskimo pottery exhibits characteristics that set it apart from other pottery types in North America,[406] it yet suggests some basis (shape, finish, decoration) for a

[399] Jenness, 1925; 1933, pp. 389–396; and 1937, p. 34 f.

[400] Collins, 1937a, p. 347.

[401] Murdoch, p. 91, Fig. 22.

[402] Stefánsson, p. 312.

[403] Stefánsson, p. 342.

[404] Stefánsson, p. 313. Dr. Stefánsson personally located for me the regions referred to in these notes.

[405] Geist and Rainey, pp. 129 ff., 151, 164, 197.

[406] Wissler (p. 70 f.) compares Eskimo and Siberian pottery on the one hand with Mandan-Hidatsa (and possibly Blackfoot, Menomini, and Pawnee) pottery on the other,

division into three main groups: southern (age as yet undetermined), ancient northern, and modern northern. As to Eskimo pottery in general, and the Old Bering Sea-Birnirk-Punuk pottery in particular, Collins assigns it a place in the ice-hunting stage of circumpolar culture and would derive the Eskimo manifestations from a Eurasian source.[407] The peculiarities distinguishing the three groups present, however, a further problem. I think it is sufficient here to indicate that this problem does exist, and to point out that the unique pot from Kodiak Island must be assigned to the southern group, whatever the origin of the characteristic features of this southern ware.

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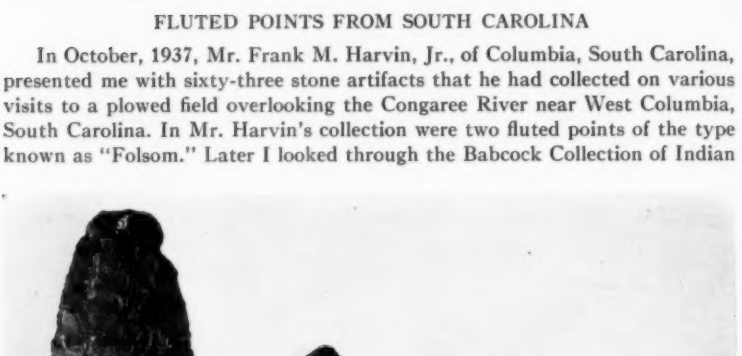
## FACTS AND COMMENTS

### FLUTED POINTS FROM SOUTH CAROLINA

In October, 1937, Mr. Frank M. Harvin, Jr., of Columbia, South Carolina, presented me with sixty-three stone artifacts that he had collected on various visits to a plowed field overlooking the Congaree River near West Columbia, South Carolina. In Mr. Harvin's collection were two fluted points of the type known as "Folsom." Later I looked through the Babcock Collection of Indian



*a* *b* *c* *d*

FIG. 30.

artifacts from Chester, South Carolina (now in the University of South Carolina Library), and found another fluted Folsom point among the hundreds of chipped implements in that exhibit. Inspection of my own collection and the Simpson Collection in Rock Hill, South Carolina, failed to reveal any other examples of this type, which has a wide distribution in the East and South, although I do not remember having seen any reported from South Carolina.

Since its possible, but as yet not well understood, connection with the true Folsom-Yuma complex farther west has already been discussed by several writers, and since these South Carolina points are merely surface finds unas-

sociated with significant fauna or stratified cultural horizons, and therefore add nothing of importance to the record, I shall limit this note to a brief description to supplement Figure 30.

The two fluted points most characteristic of the Folsom type of implement usually found in the East and South are practically identical in size, shape, and material. One of these (Figure 30, *c*) is in the Babcock Collection. The other (Figure 30, *d*), found by Mr. Harvin, is 7.2 cm. long, 2.8 cm. wide (maximum), and 7.5 mm. thick (maximum). Both points are of chert, which, in one case, grades into a reddish hue (jasper) at a wing tip. A third implement (Figure 30, *a*), also found by Mr. Harvin, is similar in shape and has the same half-hearted attempt at a median longitudinal groove, but it is made of dark gray flint and is much larger, measuring 12.2 cm. long, 3.8 cm. wide (maximum), and 8 mm. thick (maximum). The fourth point (Figure 30, *b*), in the Babcock Collection, is similar in shape and material to the third, but is intermediate in size between it and the first two, as can be seen in the photograph. If an attempt at fluting was made at all, it was not very successful. The lower half of the surface that does not appear in the figure is flat and smooth in contrast to the uneven, secondarily flaked upper half.

Mr. Harvin and I visited the field where he had found the artifacts in his collection. It is located on a flat divide, about 135 m. long and 25 m. wide, between the main valley of the Congaree River on the east and one of its tributary streams on the west, about 450 m. upstream from the bridge connecting Columbia and West Columbia. The eastern slope is wooded and descends steeply to the west bank of the Congaree about 10 m. below. Although the field was overgrown with high weeds, and thickly matted with grass and underbrush when we visited it, we found many flakes, and Mr. Harvin found an arrow-point similar to most of those in his collection. Whether this type is merely a local variation, a characteristic point of the Congaree Indians (as distinguished, for example, from the Cherokee or the Catawba), or a type of implement associated with the Folsom points, I am unable to say. Among other artifacts found by Mr. Harvin at this site are three banner-stones (two of the square type, one of the winged or "butterfly" type), a fragment of a stone pipe, fragments of two perforated ground axes (one of slate, the other, which has a pointed poll, probably of a quartz sericite schist), and part of a perforated soapstone net-sinker. I repeat that these were also found on the plowed surface, but are not necessarily contemporaneous with the Folsom points.

On a similar flat-topped bluff overlooking the Congaree River from the west, only about 450 m. upstream from this site, I had previously found a large fragment of a chipped implement made of chert, similar to that of both Folsom points described above. This material is not commonly found in Indian collections in the vicinity; Dr. Stephen S. Taber of the University of South Carolina tells me that this chert, as well as the gray flint in Mr. Harvin's collection, are importations, and that most South Carolina stone artifacts are made of a flint native to the coastal plain, or of a vein quartz found in the Piedmont.

It may be significant that we found no potsherds at the site where Mr. Harvin made his collection, for most of the plowed fields on the other side of the river yield arrow-heads of a different type and many potsherds.

The site lies within the limits of the territory which, within historic times, was known as the hunting ground of the Congaree Indians, who, according to James Mooney, formed one of the Siouan tribes of the East. The land was also claimed by the Cherokee within the historic period; the Catawba, also of Siouan relationship, and with whom the Congaree later united, often wandered as far west as the Broad River,[408] which joins with the Saluda River to form the Congaree only a short distance upstream from this field. The writer of the newspaper article referred to above points out that Indian claims frequently extended over distant areas never actually inhabited by the claimants, or perhaps abandoned many years previously, and he is of the opinion that Columbia and its vicinity lay within the Congaree domain. It must be remembered, however, that the Indians who used the Folsom points at this site may have antedated the Congaree and other historically known Indians here.

The chronological position of southern and eastern Folsom points will not be known as long as they are found, as were those reported in this letter, under conditions that do not lend themselves to stratigraphical analysis.

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## LIGHTNING SPALLING

Of interest to archaeologists is a recent paper by J. D. Laudermilk and T. G. Kennard[409] on the little known subject of lightning as an agent of weathering of exposed rocks. As a locality for field study of this natural phenomenon, they chose an area in the Mohave Desert near Yermo, California, which is known as a place of a great deal of electrical display. Here they found rocks of various sizes and materials, such as jasper, silicified lava, chalcedony, rhyolite, and quartzite. Many of these had apparently been split by some force other than great fluctuations of temperature, or by man in the production of stone artifacts. A great abundance of flakes and spalls was found on the ridges, usually in more or less circular or oval areas from one foot to five feet in radius. From the arrangement of these fragments it appeared that they had been spread from a common center in each of the areas. In many cases the flakes showed "bulbs of percussion," bulbar scars, radiating striations on the bulb, and other features typical of rocks that break with a conchoidal fracture. One major difference,

[408] Concerning the Red Men of Congaree. The (Columbia, S. C.) State, Sesquicentennial Edition.

[409] J. D. Laudermilk and T. G. Kennard, Concerning Lightning Spalling. American Journal of Science, Vol. 25, 5th Series, pp. 104–122, New Haven, Conn., February, 1938.

however, was that the flakes in most cases were not battered or bruised on the edge or point from which the force seemed to have been struck. Also, some of the rocks showed an area of localized heating characterized by radial spalls, which in some cases were dovetailed.

To test the hypothesis that lightning was the cause of some of this spalling, the coöperation of the High Tension Laboratory at the California Institute of Technology at Pasadena was obtained. With the use of artificial lightning of from 350,000 to 700,000 volts some samples of rock from the field were tested. Tests were also conducted to find out the effect of localized heating. It was found that with the artificial lightning, fractures with the same characteristics as those examined in the field could be duplicated. The localized heating tests, done with a blow-pipe and a graphite rod, were also successful. From these tests it was possible to say that: first, "—electrical discharges comparable in magnitude to lightning strokes can fracture and disintegrate rocks;"[410] second, "—that under the momentary heating due to the discharge, the moisture could be vaporized, and the air and water vapor could be heated to such a degree that they could exert great pressure without producing fusion;"[411] and third, "—the violent scattering of the tiny chips, and the production of lenticular flakes are all explainable on the basis of sudden, localized stress due to momentary heating."[412]

The authors give the following criteria for the identification of lightning spalling.[413] "The following criteria are offered for the identification of spalls produced by lightning:

"1. Formation of radial spalls, which are sometimes dovetailed, produced by the 'skinning effect.'

"2. Lack of bruising or crushing on the surface around the 'bulb of percussion.' In certain cases, however, the sledge-split boulders showed very little crushing.[414]

"3. Production of lenticular flakes.

"4. Double 'bulb of percussion.' The two bulbs are attributed to the two separate, but essentially simultaneous stresses produced by the electrical discharge at the points of entering and leaving the rock. One bulb is usually much more prominent than the other.

"When well formed 'bulbs of percussion' are found, the radial spalls are usually few in number. Likewise, if the radial spalls are abundant, the 'bulb of percussion' is usually not well developed.

"5. Relative position of original rock. In all cases the specimens formed the

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[410] *Ibid.*, p. 120.

[411] *Ibid.*, pp. 120–121

[412] *Ibid.*, p. 121

[413] *Ibid.*, pp. 121–122.

[414] An experiment was also made with a ten-pound sledge hammer, to see the effects of a blow on the same types of rock.

highest point in the immediate vicinity. Furthermore, the rocks had always been struck on their highest point.

"6. Size of rock fractured. Some are much too large to be split by man with a single blow. Repeated blows would cause considerable bruising.

"7. Apparent futility of man's splitting such rocks and abandoning the fragments."

Areas similar to those described by the authors are a common thing at quarry and workshop sites of southern California and western Arizona. They have been interpreted as areas in which a workman sat or stood and roughed out blades from fragments of the quarry material. In many cases this is true. Parts of blades are very often found among the flakes and spalls. In other cases they may be the results of lightning spalling.

It has been noted many times, especially at the quarries and workshops in the desert areas of the southwestern United States which we have examined, that flakes and spalls very often look like the work of man, and yet there is no positive proof such as definite rejects, retouched flakes, blades, or projectile points. This was well illustrated at a jasper deposit about thirty miles east of Ehrenberg on the road to Wickenburg in the western part of Arizona. There were many flakes and spalls that appeared to be the results of stone-working, but only five or six, from quite a large ground area, were of unmistakable human workmanship. The conditions were such that lightning would be a possible interpretation as the cause of many of the flakes and spalls of questionable origin. It has been noted at other quarries that, although there were thousands of fragments that were the rejects and debris of implement manufacture, there were many that did not fit into this classification. Fluctuations of temperature, the action of frost and ice, the striking of one stone against another may produce flakes and spalls, but these do not have the characteristics of human workmanship as do those resulting from the lightning fracture.

It will be of interest in the future to examine quarries and surface sites, especially in the Southwest desert areas, with this type of fracture in mind. It should not be a "catch all" for questionable fragments, because it has a limited application. The number of rocks struck during a storm would be small. It is however, a type of fracture that has to be considered, especially in desert areas.

This paper by J. D. Laudermilk[415] and T. G. Kennard is a valuable contribution not only in their own particular field of study, but also in the study of stone-working in the field of anthropology. Too little is known about the various natural forces that fracture rock, and an addition of an investigation such as this is appreciated.

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[415] See also: J. D. Laudermilk, On the Origin of Desert Varnish. American Journal of Science, Vol. 21, 5th Series, pp. 51–66, New Haven, Conn., January, 1931.

## A PROPOSED NOMENCLATURE FOR OKLAHOMA ARCHAEOLOGY

During the past few years, two attempts at usable methods of classification of archaeological cultures have been made. One is by Harold S. Gladwin, of Gila Pueblo, Globe, Arizona; the other was worked out by a group of students at the instigation of W. C. McKern, Milwaukee Public Museum, Milwaukee, Wisconsin. The present paper does not propose a different form of classification, but is a suggestion for applying the McKern system to local (Oklahoma) conditions.

The smallest or fundamental division in the McKern system is the *focus*, which can be defined as a local manifestation showing a practical identity of cultural detail. A *component* is the manifestation of any given focus at a site. By working out the degree of similarity and difference between the foci, they are grouped into *aspects* and, further, the aspects grouped into *phases*, which have complexes of important cultural limitations. Lastly, the phases are brought together under a *pattern*, defined by essential characteristics dealing with primary adjustments of peoples to their immediate environment.

In Oklahoma, it is suggested that the foci be given local names, and the aspects geographical names of somewhat larger scope. The larger groupings can very well wait until the aspects are firmly established. Many of the known manifestations in Oklahoma fit into the general frame of McKern's two culture patterns, the *Woodland* and *Mississippi*. A third, Southwestern pattern is herein called *Basket Maker*. Such noncommital terms as "late agricultural" and "early hunting" could better apply to sites in which investigations have not been carried far enough to determine connection with known cultures. Another suggestion is to set up a pattern to cover those nomadic hunting tribes not making pottery to distinguish them from manifestations that are apparently of the same general type but have a connection with pottery-making people,

Linguistic terms, such as "Caddoan," should not be used to classify a cultural site. Language is a social trait which does not necessarily determine culture. For instance, the Wichita and Pawnee are Caddoan-speaking, but differ culturally from the Caddo proper and other Caddoan peoples.

Oklahoma has many cultures which may be considered as peripheral to the main body of several basic cultures. This gives rise to a marked difference not only in the manifestations but also in the chronological sequence as compared to the cultural centers.

These brief arguments are given to warrant the proposal of a usable classification. It is not a solution of the problem of a system. A form of nomenclature is tentatively proposed to stimulate interest in a much needed and highly important part of the study of Oklahoma archaeology.

Modern methods of research and study are of quite recent use in this state; collected materials are not yet available for comparative analysis. The suggestions, since they reflect the writer's personal views, are of course subject to much revision and correction, and the inclusion of other, unnamed divisions.

Direct historical and protohistorical investigations should be carried out and tabulated culturally to determine correlating linguistic classification where possible.

The following classification is based mainly on the author's own field work. and his observations of the excavated material and sites of others.

PATTERN—Mississippi
  Phase—Middle
    Aspect—Arbuckle Mountain (the so-called Caddoan)
      Focus—(undetermined)
        Components—Red River, Big Sandy, Washita
  Phase—Lower
    Aspect—Grand River (the "mound-builders")
      Focus—(undetermined)
        Components—Wagoner, Spiro
PATTERN—Woodland
  Phase—(undetermined)
    Aspect—(undetermined)
      Focus—(undetermined)
        Components—Latta, Rock Creek, Antelope Hills (sites characterized by heavy, cord-marked pottery referred to as "Plains" type).
  Phase—Plains
    Aspect—Canadian Valley
      Focus—(undetermined)
        Component—Beaver Creek (a Woodland culture that borrowed house type from Pueblo).
PATTERN—Basket Maker
  Phase—(undetermined)
      Aspect—(undetermined)
      Focus—Cimarron (cave deposits with elements of Basket Maker).
        Component—Kenton
  Phase—(undetermined)
    Aspect—(undetermined)
      Focus—Blue Valley (Basket Maker traits that appear in rock shelters).
        Component—Canyon Springs
  Phase—(undetermined)
    Aspect—Ozark (Bluff-Dweller types that appear to have some basic traits of the Basket Maker).
      Focus—(undetermined)
        Components—Grove, Wagoner, Tahlequah.

H. R. ANTLE
Sulphur, Oklahoma

## THE WEIGHT OF AN ARROW

It seems to me that the weight of arrow-heads is very interesting. I am therefore sending you the weight of the only English arrow of which I know that has survived in really good condition. It was found a very long time ago on the field of Towton, one of the battlefields of the War of the Roses, and I think has lost nothing by rust. The weight is 9.65 grams.

C. T. CURRELLY
Royal Ontario Museum of Archaeology
Toronto, Canada

# CORRESPONDENCE

## NORTHEASTERN CLASSIFICATION

I have just finished reading Mr. Ritchie's interesting and informative article on Northeastern archaeology. The change Mr. Ritchie has introduced in his classification, in constituting his "Laurentian" an aspect of the Northeastern Phase of the Woodland Pattern, seems to me to raise certain important questions in regard to the McKern classificatory system.

Mr. Ritchie states that Laurentian has a non-agricultural economy. On the other hand the Owasco Aspect of the same phase has an agricultural economy. It has been my understanding that eventually above the pattern in the McKern system we hope to set up the base as our broadest category; the "diagnostic traits" of each base to be, as the name implies, basic. Bases were to be distinguished primarily by differences in the economy of the components involved, and secondarily by such other traits as presence or absence of pottery and presence or absence of the bow and arrow. Dr. Thorne Deuel has proposed a tentative classification which makes use of such bases.[416] Mr. Ritchie's combination of Owasco and Laurentian under one phase of course violates the above concept of a base.

The point which I should like to bring out is not that of a disagreement in the particular classification by two specialists in the field, but the underlying question of the selection and weighting of particular traits. A strong argument can certainly be advanced for the separation of agricultural from non-agricultural components. This distinction is obviously of great importance in the lives of the people. On the other hand, I feel sure Mr. Ritchie has compared his materials carefully before taking the step of including Laurentian as a new aspect under the Northeastern Phase. The similarities between the two "cultures" involved must be numerous and important. Are they to be outweighed by the trait of economy combined with lesser differences which must exist between any two aspects? The McKern system is an empirical one. If Mr. Ritchie, after examination of the material, feels that these two "cultures" are close enough together to be aspects of the same phase, can we on arbitrarily established grounds decide that they must be so far apart as to belong to different bases? In that case, however, what similarities can be set up as far-reaching enough to be the traits of the bases?

This question is an important one but it seems to me that the settling of it now is still more important. We cannot afford to have a system developing in New York which will not be acceptable in Illinois, or vice versa. If we recognize and settle the problem now we will save much future grief in revision of classifications which have become incorporated in all the work of an area.

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[416] Presented to the class in North American Archaeology at the University of Chicago, Fall, 1937.

# NOTES AND NEWS

## SOUTHWESTERN AREA

*Federal aid in Arizona archaeology.* Through the Works Progress Administration and coöperating sponsors, a Statewide Archaeological project has been made possible in Arizona. The University of Arizona, the Museum of Northern Arizona, the City of Phoenix-Pueblo Grande Laboratory, and the City of Globe-Gila Pueblo are the sponsoring institutions.

The purpose of this project is to collect surface and subsurface materials; to survey and map archaeological sites; to prepare and display archaeological collections; to design charts, maps, and drawings for publication; to prepare bibliographies and photographic records; and through stenographic work on manuscripts and field notes, prepare archaeological reports for publication.

At the present time there are four projects under operation. The Museum of Northern Arizona is excavating a site for which the general culture complex is Sedentary Hohokam. It is believed that work done at this site will throw much light on the Mogollon and Hohokam influence in the Flagstaff area.

The City of Phoenix-Pueblo Grande Laboratory is conducting a stratigraphic survey of the Salt River Valley. Test trenches are being made in as many prehistoric trash mounds as possible throughout the valley in order to determine the chronological sequence of pottery types and their related cultures. The results gathered from the stratigraphic tests, combined with the results of a surface survey covering the same area, should do much to clarify the archaeological story of not only the Salt River region, but also the surrounding cultural areas.

The City of Globe, Gila County, and Gila Pueblo are sponsoring a dual project. The excavation work being done is on an intrusive Hohokam site near Inspiration, Arizona. A partial analysis of the culture complex suggests a Pioneer phase of the Gila Basin, lying beneath an early Salado Site. Preparation of artifacts for display and restoration of pottery is being carried on in the Gila County Museum.

The Arizona State Museum at the University of Arizona is undertaking a systematic check and revision of the catalogue system. A complete bibliography of each Southwestern ethnic group is being prepared, and it is hoped that, upon completion, these will be available to the public. Perhaps one of the most interesting phases of the work is the planning and preparation of several ethnological dioramas. (*E.W.H.*)

During the University of New Mexico's academic year 1937–38, Dr. Florence M. Hawley, Assistant Professor in Anthropology at the University of New Mexico, was Research Associate in Dendrochronology and Assistant Professor of Anthropology at the University of Chicago. During that time and during the early part of the summer, until July, 1938, Dr. Hawley and her husband, Mr. Donovan Senter, carried out field work in the dendrochronology of

the middle Mississippi River drainage. During August, Dr. Hawley was lecturer in archaeologic chronology and ceramics at the University of New Mexico Chaco Field Session, and in September she returned to the University to give her regular classes for the first semester of the academic year 1938–39.

Also during 1937–38, Mr. Frank Hibben, Instructor in Anthropology and Curator of the Museum of Anthropology, was on leave of absence studying toward his Ph.D. at Harvard University. During the summer of 1938, Mr. Hibben was a Fellow in the American School of Prehistoric Archaeology which carried on work in Central Europe under Dr. Fewkes. Hibben has returned to full-time work at the University, where he is concentrating upon the cataloguing of existing museum material.

As of February 1, 1938, Dr. Reginald G. Fisher, part-time Assistant Professor of Anthropology, was transferred to full-time work with the School of American Research and the Museum of New Mexico, and Mr. Paul Reiter, formerly Curator of Archaeology at the Museum of New Mexico, became a full-time member of the University staff as Instructor in Anthropology and Assistant Curator of the Museum. Reiter has been in charge of the University's WPA project in the Chaco Canyon ever since February, with the exception of the month of August when he was supervisor of excavations at the Jemez Field Session.

Dr. Mamie Tanquist Miller handled her regular course at the University during the academic year 1937–38, and then taught all of the campus courses in Anthropology offered in the 1938 summer school.

Dr. W. W. Hill, who was added to the department as Assistant Professor of Anthropology in September, 1937, carried on library research in California during June and July, and then directed the Jemez Field School during August, 1938. Dr. Hill is taking a year's leave of absence, beginning in February, 1939, to become Assistant Curator of American Ethnology at the United States National Museum.

Dr. Donald D. Brand taught at the San Diego State College summer school during June and July, and directed the Chaco Field Session in August, 1938.

Most of the University's summer activities were in connection with the two field sessions in the Jemez and Chaco Canyons. The 11th annual general field session (for beginning students) was held in the Jemez Canyon after a lapse of two years. A faculty which included Dr. Emil Haury of the University of Arizona, Dr. Norman Cameron of the Johns Hopkins Hospital, and Mrs. Anne Cooke of Yale University, in addition to members of the University faculty, gave varied anthropological lectures, and conducted excavations at Nonashagi Pueblo. For the third year a field session of the University of New Mexico was conducted in the Chaco Canyon. This year attendance was restricted to advanced and graduate students. Field work was along two lines: ethnography of the Navaho, and the excavation of some small house units east of Casa Rinconada, continuing the work of the two previous seasons. Instructors, in addition to members of the regular faculty, included Dr. Ernst Antevs of the Car-

negie Institution of Washington, Dr. Arthur Kelly of the National Park Service, Dr. Clyde Kluckhohn of Harvard University, and Mr. Donovan Senter of the University of Chicago. One of the primary results of the archaeological work in the Chaco was the determination of certain soil profiles which may prove to be of diagnostic value, both chronologically and culturally.

Other than the summer work, the only field archaeological activities pursued by the University were in connection with the WPA project for the excavation and repair of small sites in the Chaco Canyon. This project has, to date, concerned itself primarily with the development of field facilities for further work. Permits from the Department of Agriculture have been secured for cave excavations in the Sandia Mountain and Jemez Canyon areas, but active field work has not yet been initiated.

Of some interest may be the initiation by the University of New Mexico of a flying extension school. Every Monday afternoon four University instructors are deposited in as many towns in the far southeastern portion of the state, and are then collected the following morning and returned to the University. Among these four instructors, representing four fields, is Dr. D. D. Brand who is instructing a course in Southwestern archaeology at Clovis, New Mexico. The Clovis extension class has already made one field trip to the Black Water Draw area now famous for its Pleistocene fauna and for its Folsom-Yuma archaeological complex. (*Donald Brand.*)

## GREAT PLAINS AREA

The field season of the University of Nebraska Archaeological Survey, under the direction of Dr. Earl H. Bell, was brought to a close the first part of December. Through the coöperation of the Works Progress Administration, work was conducted on a much larger scale than ever before. Three parties were in the field from the middle of June until the first of December. For the past several years preliminary work has been carried on in the northeastern part of the state. That work had opened up many problems and, consequently, the work of this year was carried on in the same area.

One party worked in Holt County, Nebraska, about twenty miles northwest of O'Neill. The site consisted of eleven mounds. The burials were interred in pits beneath the mounds. Both cremations and bundle burials were found. Unfortunately, most of the osteological material was in such poor shape that anthropometric observations were impossible. Those skulls sufficiently preserved to permit the computation of their cephalic indices were found to range in the upper limits of dolichocephaly. A considerable quantity of pottery was associated with the mounds. The type of ware, shape and decoration of the pottery, taken together with the presence of stemmed arrow points, indicated the culture to be that commonly designated as "Woodland" in the northern Mississippi area. Upon completion of these mounds, the party moved to a site at the mouth of Redbird Creek on the Niobrara River, just south of Lynch, Holt County, Nebraska. This site consisted of numerous circular house pits

with entrance ways to the east and southeast. The pottery and other artifacts were almost identical to those of native manufacture from the historic Ponca site at Verdel, Nebraska, which was excavated in 1937. The culture seems to be related to the Upper Mississippi Phase of the Mississippi Pattern. One strikingly unique characteristic of the pottery is the use of crushed, burned bone for tempering. The distribution of this culture almost exactly corresponds to the traditional range of the Ponca tribe.

A second party worked at Stanton, Nebraska, at the mouth of Indian Creek on the Elkhorn River. The site consisted of circular house pits. The pottery and other artifacts are very similar to those from sites designated as the Oneota Aspect in Iowa, Wisconsin and southeastern Nebraska. The village offers a good example of the contact period of Indian history. The artifacts included: pottery vessels and copper kettles; flint, iron, and copper projectile points; beads of native manufacture as well as glass trade beads; pottery, catlinite, and trade pipes; disks of porcelain; and old American bottles. After completion of this village, the group worked in one of the many prehistoric Upper Republican culture villages which are close by.

The survey of the immediate area led to an interesting site about nine miles northeast of Stanton. In that region the Elkhorn River has been straightened by drainage ditches. On the dirt piles of these ditches were found pottery and projectile points of the Woodland type which could only have come from a depth of eight to ten feet below the present surface, upon which is a prehistoric village of the Upper Republican culture.

The third party worked in Dixon County, Nebraska, near the present village of Ponca. At first a village of an unknown variant of the Nebraska culture was excavated. After the completion of this village, the party moved to another site. This site consisted of at least three culture strata in an old terrace remnant. (During the last day of work a fourth stratum was discovered a short distance up-stream. At the present time its relationship to the other three strata has not been determined.) The first, or lower stratum was separated from the second stratum by thirty-two inches of sterile soil. The second and third levels were separated by seventeen inches of sterile soil. While the artifacts of all three strata were of the Woodland type, the pottery showed a remarkable evolution in quality, hardness, thinness, and design from level to level.

Dr. Earl H. Bell offers these general conclusions. "The Ponca were probably in this region for a minimum of three hundred years. This could well be extended to five hundred years as a conservative maximum. I can find no traditions, either in the scientific literature or in my own ethnological researches, indicative that the Ponca came in contact, or conflict, with the rectangular-house people who possessed the Upper Republican and Nebraska cultures. It may well be that at the time of the arrival of the Ponca, this earlier people was already disappearing from the region. From the great profusion of sites of the prehistoric Upper Republican and Nebraska cultures, we must either deduce the presence of a very great population for a short time, or a smaller population

which existed in this region over a relatively long period. The latter proposition appears much more tenable than the former. We might estimate that peoples with the Upper Republican and Nebraska cultures occupied this region for five hundred years. Assuming their population to be roughly that of the Ponca, I see no reason to believe that they were here for a shorter length of time. In fact, since the village sites are more extensive and more numerous than the Ponca, it seems that we are justified in this rather conservative estimate. From the data at certain sites it seems apparent that during a portion of the time the Upper Republican and Woodland cultures were contemporary. On the other hand, there seems no doubt that the Woodland culture was in the region before the arrival of the later prehistoric groups. The presence of Woodland sites in old terraces, several feet beneath the present surface upon which are the remains of Upper Republican villages, in my mind clinches this interpretation. It would seem that the minimum and most conservative estimate for the span of history represented by pottery-making peoples would be one thousand years, and I do not believe that a 50 per cent addition, say 1500 years, would be unreasonable." (*E. H. Bell.*)

## NORTHEASTERN AREA

The following account is from Wendell S. Hadlock, of Ellsworth, Maine: "For the past two years the Robert Abbe Museum, Bar Harbor, Maine, has engaged in excavating a shell heap at Tafts Point, West Gouldsboro. This site gave up sixty plummets all of which came from the lower horizon, where a number of slate points of several forms were also found. One burial was found covered with red ochre but with no grave goods. The remains had deteriorated to such an extent that it was not possible to gain any information other than the position in relation to the shell heap. Pottery was found in the upper half of the refuse. From the fragments one is able to tell the shape and sizes of the vessels, and it was found that they had conoidal bases, were grit tempered, and a few showed channeling on the inside. A few potsherds definitely show Iroquoian influences. Bone and a few antler implements, consisting of harpoons, mat needles (needles one and one-half inches long and one-sixteenth inch wide, with a small eye in one end), beaver-incisor cutting tools, awls, flakers, and beads, were found throughout the entire heap. Stone artifacts show a few differences in type which might be of some significance. It is hoped that from a study of this material, and from the notes and drawings taken during excavation, a great deal of information about the Indians of Maine will be brought to light. At the present time it might seem that this heap was made up from two cultures, due to the fact that artifacts found in the lower horizon were not found in the upper horizons, but a more intensive study of the notes and artifacts may prove otherwise. It is hoped that a final report on the shell heap will be completed during this winter." (*W.A.R.*)

Irving Rouse reports that although the Peabody Museum of Yale University has sponsored no field work recently, a graduate student, Mr. Arthur H.

Jackson, is working upon the Museum's collections of Connecticut archaeology. "Mr. Jackson is attempting to determine the nature of the stone in artifacts from an Indian village site at Rocky Hill, Connecticut. He hopes to determine the origin of the kinds of stone used for making these artifacts, whether local or from outside the state, and to note correlations between the different kinds of stone and the various types of implements." (*W.A.R.*)

During 1938, the Museum of the American Indian, Heye Foundation, "accomplished small excavations on several New York City sites, as well as on one in Delaware County. From June to September, excavations were conducted on a number of pre- and post-contact sites in Madison and Cayuga Counties, New York." (*W.A.R.*)

The Van Epps-Hartley Chapter, New York State Archaeological Association, at Schenectady, is intensively studying several sites of the Coastal Aspect in the Mohawk-Hudson area. John A. Angus, P. Schuyler Miller, and Vincent J. Schaefer report that one of these is a stratified station of exceptional interest, in which the upper horizon shows historic contacts. (*W.A.R.*)

During 1938, Dr. Frank G. Speck, of the University of Pennsylvania, continued his field studies of the historic background and techniques of color stamping on leather and basketry among the northeastern Algonkin peoples. He also resumed his recording of ceremonial procedures of the Delaware-Munsee, of Six Nations, Ontario, and his ethnological work in linguistic recording, outlining of the economic cycle, and strengthening the evidence of the surviving ceramic technique of incised decorations with red filling (sealing wax) among the Catawba (Siouan) of South Carolina.

An ethnological survey of the Houma (Muskhogean) of Louisiana was undertaken as part of the Southeastern field project. (*W.A.R.*)

## SOUTH AMERICAN AREA

Mr. L. W. Henry, through the writer, has presented to the University of California Museum of Anthropology, a collection of Peruvian potsherds collected near Lake Junin, Department of Junin, Peru. The bulk of the material is red-on-buff painted ware, which in its use of repetitive small elements superficially suggests Hohokam wares from Arizona. Characteristic designs comprise all-over patterns of spirals surrounded by dots; U-shaped designs; S-shaped designs; parallel wavy lines; and variations of these patterns, all of which appear to be unduplicated in other Peruvian collections. There is also some plain red-painted ware, gray ware, and black ware with interesting incised and punctate designs. (*Gladys A. Nomland.*)

## CONFERENCE ON ARCHAEOLOGICAL TECHNOLOGY IN CERAMICS

On November 17, 18, and 19, 1938, a conference was held under the auspices of the National Research Council at the Museum of Anthropology of the Uni-

versity of Michigan to discuss problems and methods of archaeological technology as applied to ceramic data. Eleven individuals particularly interested in this subject were in attendance. Following a series of brief statements describing the work in progress by each of the delegates, papers were given upon the techniques of petrography, ceramics, and chemistry which are being used in the analysis of archaeological ceramic materials. Later sessions were devoted to the discussion of the descriptive standards, terminology, and classifications of data on such subjects as construction, color, texture, surface finish, pigments, and firing. Finally, the ways in which the results of technological investigations of archaeological ceramics have been and may be applied to the Southwest and the eastern United States were reviewed.

Ceramic technological research in the field of archaeology is one result of the growing tendency to employ the methods of the exact sciences in various branches of anthropology. Group discussion emphasized the fact that archaeological ceramic technology includes the application of methods of the exact sciences in the identification of ceramic materials and in the study of methods of pottery making, with the objective of understanding the resultant data in their relation to culture history. The methods to be used in a particular project should be determined by the character of the ceramic development represented, and by the nature of the archaeological problems involved. It was further understood that research in this field should be directed toward specific problems. Such problems should be outlined and their significance evaluated by consultation between archaeologist and technologist, and conclusions should be based on careful correlation of results of the two aspects of ceramic investigation. In order to continue the spirit of the conference, to facilitate the development and wider application of new methods of analysis, and to clarify terminology, three informal committees were organized to deal with problems in the following specific subjects and general fields:

Pigment analysis and chemistry
Color standards and ceramics
Texture, Construction, and Petrography

The individuals attending the conference were George Brainerd, Ohio State University; Harold S. Colton, Museum of Northern Arizona; Carl J. Engelder, University of Pittsburgh; Vladimir J. Fewkes, University Museum, Philadelphia; Nora Gladwin, Gila Pueblo, Globe, Arizona; James B. Griffin, University of Michigan; Carl E. Guthe, University of Michigan, who acted as informal chairman; Donald Horton, University Museum, Philadelphia; Frederick R. Matson, University of Michigan; Anna O. Shepard, Carnegie Institution of Washington; and Dorothy Wycoff, Bryn Mawr College, Pennsylvania. (*A.O.S.* and *D.H.*)

## SIXTH PACIFIC SCIENCE CONGRESS

### Plans for Anthropology

Plans for holding the Sixth Pacific Science Congress from August 7 to 16, 1939, at the University of California and Stanford University, near San Francisco, are now maturing, under the U. S. National Research Council, coöperating with the two universities mentioned, and with other interested institutions and individuals. The present memorandum is in the nature of a preliminary announcement.

For the Section of Anthropology, two symposia are planned, as follows:

1. Antiquity of man in South and East Asia, the Pacific, and the Americas.
2. Objectives in Pacific physical and cultural anthropology.

These symposia will give a definite unity to the program of the Anthropological Section, and at the same time should enable anthropologists with varying interests to find a place for their contributions and discussions. It will be noted that, while there is no special symposium devoted to physical anthropology, papers relating to this subject may find a place under one or other of the topics defined.

It is suggested that papers dealing with objectives concern themselves not with theoretical considerations but with concrete data illustrative of problems and findings in current research.

Each anthropologist receiving this memorandum may take it as an invitation to contribute a paper to one of the symposia, even if unable to attend the Congress. Papers to be read at the Congress should be forwarded to reach Washington not later than July 1, 1939. The undersigned will be happy to receive communications relative to papers to be contributed, or correspondence concerning the Congress. The program for the Anthropological Section is definite; nevertheless, any suggestions from those interested, proposing modification of the program, will receive careful consideration.

A. L. Kroeber, Chairman, Department of Anthropology, University of California, Berkeley, California.

E. S. C. Handy, Anthropological Member of the Committee on Pacific Investigations, National Research Council.

N.B.: Communications referring to the Anthropological Section of the proposed Pacific Science Congress should be addressed to Doctor Handy in care of Doctor Albert L. Barrows, Executive Secretary, National Research Council, 2101 Constitution Avenue, Washington, D. C.

## MONOGRAPHS OF THE AMERICAN ETHNOLOGICAL SOCIETY

The Board of Editors for the Monographs of the American Ethnological Society announces that manuscripts to be considered for 1939 publication can be submitted on or before April 1, 1939. Manuscripts should not exceed 75,000 words (about 175 to 200 pages of print); must be in the general field of ethnology, or social or cultural anthropology; and should be in condition for immedi-

ate printing. They should be addressed to the Secretary, American Ethnological Society, c/o Department of Anthropology, Columbia University, New York City. Manuscripts not accepted for publication will be returned to the authors after the selection has been made.

CLARK WISSLER, Chairman
A. I. HALLOWELL
ALEXANDER LESSER

## OBITUARY

Professor J. E. Pearce, of the Department of Anthropology, the University of Texas, died at his home in Austin on October twenty-second, 1938, in his seventieth year.

His contribution to our discipline has been not in numerous publications, but in building a department of anthropology, and envisaging a great state museum.

Against the odds of prejudice, suspicion, and overt antagonism from many sources, he founded a department when anthropology was little recognized and hardly respectable. That such a department exists is mute evidence of his untiring efforts, his fearless and courageous fight for what he believed to be a source of truth, tolerance, and enlightenment. Men of lesser determination and energies would have despaired.

His dream of a natural history museum was a part of his interest in the anthropological field. Even before the department was well established, he began a never-ending fight for a state museum. University bulletins, articles, and pamphlets were written by him in an attempt to arouse public interest. With the Texas Centennial Anniversary, he seized the opportunity of an awakened interest and almost single handed was responsible for the inception of the present Texas Memorial Museum. He lived to see this dream become a reality. He served as temporary director, but died a few weeks before the museum was opened to the public.

His recent publications in the field of archaeology, and his editorship of the Anthropological Papers of his department, are well known; but his pioneering efforts in exploring the vast field of Texas are not fully appreciated. For many years he obtained funds for archaeological research, and in many regions of Texas excavations were undertaken before commercial exploiters had an opportunity of destroying sites. At the time of his death he was Director of the State-wide WPA Archaeological Project, as well as temporary Director of the Texas Memorial Museum and Professor of Anthropology.

With his passing, anthropology has lost a fearless pioneer, a courageous fighter, a tireless worker. Those of us who knew him well will sorely miss his sympathetic guidance and understanding.

*Selected Bibliography*

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1919 Indian mounds and other relics of Indian life in Texas. American Anthropologist, N.S., Vol. 21, p. 223.
1921 Museums: their use and place in learning and in the transmission of culture. University of Texas Bulletin No. 2133.
1924 Need and opportunities for anthropological research in the Southwest. Southwestern Political and Social Science Quarterly, Vol. 5, No. 3.
1926 Facts and opinions supporting the demand for a Texas State Museum. The Texas State Museum Association.
1927 Anthropology as an element of rational education. Southwestern Political and Social Science Quarterly, Vol. 8, No. 3.
1927 A summary of reasons why Texas should have a State Museum. Texas Museum Association, Bulletin No. 3.
1932 The archaeology of East Texas, American Anthropologist, N.S., Vol. 34, p. 670.
1932 The present status of Texas archaeology. Texas Archaeological and Paleontological Society, Vol. 4, p. 44.
1933 (With A. T. Jackson) A prehistoric rockshelter in Val Verde County, Texas. Anthropological Papers, University of Texas, Vol. 1, No. 3.
1933 The archaeology of Texas. Texas Almanac.
1935 Tales that dead men tell. Anthropological Papers, University of Texas, Vol. 1, No. 1.
1938 Geographic influence and civilization, with especial reference to Indian Texas. The Texas Geographic Magazine, Vol. 2, p. 1.

GILBERT MCALLISTER
University of Texas

## BOOK REVIEWS

*Primitive Methods of Working Stone, Based on Experiments of Halvor L. Skavlem.* A. W. POND. (Logan Museum Bulletin, Vol. 2, No. 1, 143 pp., 64 plates, 5 figs., Beloit: Beloit College, Wis., 1930.)

This report on methodology in the working of stone gives a very concise description of those techniques employed by Mr. Halvor L. Skavlem. It is profusely illustrated, the material well arranged, and a comprehensive bibliography of primitive stone working included. However, if, as Mr. Pond intimates, the paper is intended primarily for those students who are interested in duplicating Mr. Skavlem's accomplishments, there are several misleading interpretations of fact which should, for the sake of the student, be clarified.

In the first place, it is questionable whether the working of stone in the manner of the aborigines ever was a "lost" art, since we have an abundance of recorded evidence by recognized observers compiled from personal observations of the aboriginal lapidary. However, some of the finer points of their work, such as the fluting of Folsom points, the making of long, thin flake knives, and the so-called "ripple flaking," have been lost and to date have not been recovered. Also, although not mentioned in the report, there are others who have done as much work along this line as has Mr. Skavlem. Joseph A. Barbieri, for instance, has experimented and manufactured primitive implements for over thirty years. To quote Edward T. Stevens (Flint Chips, p. 591), "There were heroes before Agamemnon, and forgers of flint implements before Flint Jack." This is further emphasized by Evans, in his "On the Forgery of Antiquities" (Transactions of the Royal Institution, Feb. 24, 1865). Mr. Skavlem has undoubtedly done some good work, but the majority of the plates exhibited in the report show rather amateurish efforts easily duplicated without any great measure of skill.

In his discussion of the workability of fresh and debris flint, the author includes a strange statement to prove his point that the Indian did not bury flint blanks to render them more usable. "Similarly," he says, "finding 'caches' of flint blanks in swamps is easily accounted for by the fact that such swamps were lakes one or two centuries ago and doubtless the canoe carrying these blanks was tipped over." Cache finds of blanks or disks in swamps have been few. I. A. Lapham, quoting Dr. Philo Hoy, relates in his "Antiquities of Wisconsin" the discovery of forty flint disks in a swamp near Racine. Mr. D. Hitt, in O. T. Mason's "Summary of Correspondence" in the Smithsonian Report for 1879 (p. 435), notes a deposit of sixty-five flint disks found in La Salle County, Illinois, in the center of a small pond. Hitt adds that "the proprietor, Mr. Osburn, thinks they were transported in a canoe, which was capsized at this point." Perhaps Mr. Pond got his idea from Mr. Osburn. Out of sixty-three documented finds of flint-disk or blank caches, only these two were anywhere near a swamp or in low ground where a swamp once may have been. Mr. Pond might better have admitted that the Indians unquestionably did

bury disks and blanks, although perhaps not for the reason that this treatment made them more workable.

The problem of properties, formation, and composition of flint, solved by the author by freely quoting from J. F. Kemp's "Handbook of Rocks, &c.," is one which can not be handed over to one authority, disregarding the remainder who may have something additional to contribute. Although the paper is largely free of typographical errors, the name of S. Hazzledine Warren is misspelled. Moreover, Dr. Burkitt is misquoted, and possibly misinterpreted.

On the whole this report is a distinct contribution to the interpretation of some of the techniques utilized by the aborigines. While it does not cover all the possible methods used, it does explain in every mechanical detail those demonstrated by Mr. Skavlem. The complaint of the student attempting to duplicate Mr. Skavlem's handiwork may well be this mass of detail. However, Mr. Pond, by including this critical examination of the mechanics of flint, has provided one of the most precise compilations on this theme to be found anywhere in the literature.

H. Holmes Ellis
Lithic Laboratory
Ohio State Museum

*Central Texas Archeological Society Bulletin, Nos. 1–2.* (Waco, Texas, January, 1935, and March, 1936.)

*Central Texas Archeologist, No. 3.* (Waco, Texas, December, 1937.)

The above three publications of the Central Texas Archeological Society at Waco set a high standard, in both format and contents, for smaller archaeological journals, professional as well as amateur. Especially striking are the quality of printing and the abundance of excellent illustrations, both sketches and photographs. The articles and reports are for the most part very well done, and interesting as well as usable and instructive. The effect of the publications as a whole is certainly not amateurish, and the Society is to be complimented for publishing its work in such excellent fashion, as well as so commendably promptly. Change of name with the third issue is regrettable, especially as the new name is less pleasing.

In the editorial comment by Frank H. Watt, in the third issue, the general policy of the organization is stated: "In the past issues of our bulletin we have not attempted to produce lengthy reviews or extensive reference lists, or to make comparisons and draw formal conclusions about the cultures of the area. Our work has been, rather, a recording little by little of what we have so far found in central Texas." This restraint is truly admirable; pure recording of data with as few expressions of opinion as possible should be the primary objective of all such groups as this. Some comparison with adjacent areas, as for example with material published in the *Texas Archeological and Paleontological Society Bulletin* (Abilene, Texas, 1929–), would be desirable perhaps, but the

lack of comparative work is more than compensated for by the refraining, except in a very few articles, from theorizing and generalizing from incomplete data.

Numerous excavations and reconnaissance-surveys in central Texas are described. Most of the papers are very satisfactory, thorough, and interesting. Among the excavations, the reports on the Aycock shelter, by Frank H. Watt, and a mass burial near Waco, by Dr. W. P. Meroney, especially show competent excavation and careful recording.

Outstanding among survey reports are those of Frank Bryan on western Limestone and Navarro counties. The separation of older sites and Tawakoni sites on the basis of certain artifact types is interesting, and undoubtedly correct. Only one of his sites is not one of these groups, or else a mixture of the two; it has different types of points, and sparse sherds of an engraved red pottery (a trait belonging further east and northeast). Mr. Bryan shows a clear grasp of the problems and of approaches to them. His method for outlining the limits of Tawakoni culture is absolutely correct; and especially to be commended and taken to heart is the following comment: "Until a specific type of artifact is tied down and given a name, it has a tendency to float around as an indefinite something." The names for certain stone artifact types are not all very aptly chosen; but Mr. Bryan—from his geological training perhaps—has the scientific approach, and here has understood something that not all professional archaeologists realize.

An extremely interesting topic deals with the occurrence of buried middens along the Balcones fault-line. This, as well as the geology of other sites, is competently and interestingly discussed by Frank Bryan; as also in an article by him, in another publication, reviewed by W. Van Royen in a recent issue of AMERICAN ANTIQUITY (Vol. 3, No. 3, pp. 285–286).

Other excavation and survey work of interest includes: an unusual burial, in a gravel pit near Little River, reported by Frank H. Watt, with an extremely dolichocephalic skull (cranial index 69.5), rather similar to the Aycock shelter burials, and tying in with the numerous very narrow-headed specimens found in different parts of Texas (lower Gulf Coast, trans-Pecos, and near Abilene); a burial area in northeastern Red River County, evidently associated with a village site, with good descriptions of burials and of pottery, the latter not wholly clear on a few minor points; and a particularly worthwhile discussion, by F. A. Runkles, of types of sites and types of artifacts in Comanche County, a thorough general discussion of stonework especially, embodying some very sensible points of view.

Of the articles on special subjects, those on somatology, especially pathology, by medical men for the most part, are of particular interest, dealing with often-neglected topics. Dr. Konrad Lux contributes three papers, with very helpful illustrations, on teeth, especially dental pathology; Dr. Turner, two valuable studies of arthritis in central Texas skeletons; Dr. Aynesworth, an interesting and well-done paper on arrow-point wounds, and a biographic study

of the Aycock shelter skulls. In this last, the skulls in the illustrations are not all properly oriented in the Frankfort plane, which would materially affect many observations and measurements, such as angle of prognathism. Also, the type might more profitably be compared to other published Texas skeletal material of very dolichocephalic type than to European Aurignacians. The skeletal material from a mass burial near Waco is briefly but competently reported by Frank H. Watt and W. P. Meroney. The work evidently was skillfully and thoroughly done, and their figures may be accepted without hesitation, probably; but the measurements and indices of three immature individuals (about 4, 7, and 17 years old) were included in the computation of averages. These three have, for example, the highest cranial indices of the series of twelve skulls; excluding them, the average c.i. is 73.57 instead of 75.01.

Glass trade beads—another relatively neglected subject—are treated in a very good paper by Frank Watt and Dr. Meroney, summarizing and classifying finds; a worthwhile study with good illustrations and bibliography. Its accuracy is confirmed by the appended statement from Arthur Woodward of the Los Angeles Museum.

An interesting paper on Texas pictographs is contributed by Forrest Kirkland. It is hoped that the drawings to scale in color that Mr. Kirkland has made will be filed with the Central Texas Society, or some other suitable repository. Descriptions are good, and the discussion very sane and intelligent.

A short article in the first bulletin by A. T. Jackson of the University of Texas provides good advice and guidance for amateurs; it might be pointed out, however, that field notes should *not* be in ink when there is possibility of their getting wet, and that newspapers make good packing for most specimens not delicate or very small.

The two-page map of Texas in the first issue is of value as showing physiography and geology as well as anthropology; there are a number of errors as regards historical tribes—unfortunate classification in the table, and boundaries not quite correct throughout.

Two minor excavations in the Mimbres Valley, southwestern New Mexico, are partially published. Despite briefness of the work, and use of the iron prod, these excavations do not classify as "pot-hunting," as rooms were cleared, and burial methods and other features carefully observed. In the first, by Mr. W. H. Dietz, a pottery vessel, partly black-on-white and partly red-on-white, is recognized as not uniformly fired; a red-on-white seed jar appears to be actually so (Three Circle); four obsidian arrow-points are mentioned but not described. The other, by Mr. Sam Horne, describes a very interesting covered urn cremation. Two of the three vessels have quite unusual designs. A mountain-sheep effigy jar was also found. The site at which this work was done is not identified. A note by G. de Graffenreid, on exploratory investigations on the San Francisco River in southwestern New Mexico, lists several finds but gives no data.

A number of shorter or less significant articles have not been discussed; they vary in quality.

Information is requested (F. H. Watt, Box 1176, Waco, Texas) on "net-sinkers," of whatever area.

It might be emphasized that the names "Waco" and "Tehuacana" refer to the same group; "Tawakoni" is perhaps the preferable form of the name. The term "Caddoan" is preferable to "Caddonean."

On the whole, the publications of the Central Texas Archeological Society are extremely good, and show understanding of the essential problems and the proper approaches to them, and sane and intelligent attitudes and ideas. This organization is making a very real contribution, and is to be encouraged in its work in every way possible.

ERIK K. REED
National Park Service
Santa Fe, New Mexico

*Classification of Black Pottery Pigments and Paint Areas.* FLORENCE M. HAWLEY and FRED G. HAWLEY. (University of New Mexico Bulletin, Anthropological Series, Volume 2, Number 4, 27 pp., 2 tables, Albuquerque, 1938.)

The first section of this paper deals with the black pigments of prehistoric Pueblo pottery and purports to bring our information on this subject to date. Tests for the identification of black pigments are reprinted from an earlier paper, a tabulation of pigments of pottery types is given, and the geographic distribution of the two principal classes of black paint is discussed in an attempt to explain certain isolated occurrences which, at the time of publication of the first paper, seemed anomalous.

To evaluate a report of this kind we have to consider the reliability of the methods proposed, the accuracy of identifications made, the understanding of basic properties of paints, and the soundness and significance of the conclusions drawn. The tests for paint identification are reprinted, without modification, from a paper which appeared in 1929. They have been discussed in some detail in a recent technological report, and it is only necessary to say here that the oxidation test for carbon and for iron is reliable for a large proportion of paints of this class if used with judgment. There is, however, a class of organic paints, those in which action of the paint liberates iron from the clay, for which it is not reliable. The procedure proposed for identification of manganese seems unnecessarily awkward when compared with microchemical techniques. The suggestion is made that the paint of most specimens can be identified by visual inspection relying on color and smoothness or relief, but no reference is made to the many factors which may cause error in such identifications.

In view of these considerations it is not surprising to find cause for disagreement regarding a number of paint identifications given. The paint of the important group of wares from the Hopi country which were oxidized in firing, including Jeddito black-on-orange, Jeddito black-on-yellow, Bidahochi, Sikyatki, and Kawioku polychromes, are set down as "iron (probably plus carbon)," and,

therefore are not differentiated from the iron paint of black-on-white ware, yet Dr. Hawley doubtless knows that the latter kind of paint, if fired in oxidizing atmosphere, as were the Jeddito wares, would turn red or red brown. Microchemical tests have shown that the paint of the Jeddito group of oxidized wares, like the paint of many other types of this class, contains manganese and should, therefore, be differentiated from the iron paint of black-on-white ware. The same criticism may be made of the paint identification of the Pueblo III black-on-red, and polychrome types of the White Mountain district. Six types are here classed as iron, yet the properties of the wares show that the paint cannot be of the same type as that of black-on-white ware.

Deadman's black-on-red is classed as carbon. It is possible to use an organic paint on a red ware, but it is rarely found because few of the red-burning clays have the properties necessary to hold a carbon paint. All examples I have seen of Deadman's black-on-red have the properties of an iron-manganese ore paint, and the presence of manganese has been proved by microchemical test. Other identifications might be questioned, as that of Lincoln black-on-red paint, but enough has perhaps been said to show the necessity of a careful recheck of the Hawley identifications.

Discrepancies in the Hawley analyses may, in part, be explained by faulty selection of material. The tabulations do not record the number of samples tested, nor the exact provenience of the sherds used, and some of the pottery types listed have not yet been described specifically enough to insure certainty of identification. It is to be noted that Dr. Hawley states that a previous error in the identification of paint of Pecos black-on-white pottery was due to the fact that a single sherd was tested and this later proved to be an intrusive. It is hardly necessary to point out that the analyst should assume responsibility for the selection of adequate and representative material as well as for the accuracy of his methods of identification.

Several statements indicate lack of understanding of or inexperience with ceramic pigments. The yellow group of pigments is described as basically limonite or yellow iron oxide, disregarding the fact that limonite is dehydrated in firing and then assumes a red color. Wares decorated with organic paint are said to be polished after painting. This error has been fully discussed elsewhere, and it is unfortunate that it should be repeated here, for the archaeologist is dependent upon the judgment of technologists in matters of this kind (Kidder, A. V. and Shepard, A. O., *Pottery of Pecos*, Vol. 2, Andover, 1936, p. 420). Such mistakes should be checked before they become too deeply rooted through thoughtless repetition.

The archaeologist will be more interested in Dr. Hawley's discussion of the distribution of paint types and their archaeological significance than in technical questions relating to identification. Dr. Hawley stresses the value of paint identification for classification of pottery types and points out the constancy of paint in given regions. She shows that the relation of the Chaco district to the

Little Colorado culture center, and the recognition of Mesa Verde influence in the Upper Rio Grande explain the paint types in these regions. She suggests that what has been considered the Eastern Area, characterized by the occurrence of mineral paint, might more properly be called the Southern Area, and the Western Area, in which organic paint was used, the Northern Area.

Sweeping conclusions regarding the distribution of paint types are premature, but the general outline of the distribution of organic and iron paints of black-on-white ware, which Dr. Hawley gives appears on the basis of present knowledge to be, in the main, correct. There is still much detail to add before we can trace fully the spread of techniques in the use of paint and the evidence which they preserve of the contacts and movements of peoples. In building up these data reliance cannot be placed on inadequately described pottery types, and excavated material will be found most useful in tracing changes in techniques of painting. Many peculiarities of technique indicated by the properties of these paints should be investigated, for there is an unfortunate tendency to disregard this evidence with the establishment of a simplified classification.

The second part of this paper, by F. G. Hawley, deals with the chemical analysis of prehistoric Southwestern glaze paints. Mr. Hawley describes a method for the qualitative determination of lead and of copper, and reports the results of qualitative tests of the glaze of a number of pottery types and a quantitative analysis of a composite sample of Rio Grande glaze. There is also a brief general discussion of the composition of lead glazes and a consideration of possible sources of glaze materials. The methods described are expressly not for the use of the archaeologist, yet they are described in simple terms which may tempt the archaeologist to try them. Before the chemist would apply them he would compare a number of other tests which are fully described in the literature of microanalysis. It will be noted that Mr. Hawley does not consider accurate quantitative identification of pigments necessary, because the Indian used impure and highly variable materials. The fact, however, that we are dealing with material of variable composition does not mean that we are justified in introducing a source of error in our work by substituting rough estimates for accurate determinations. It is true that qualitative tests may often serve to answer our questions and that the time and expense involved in quantitative determinations may not, in many instances be justified, but when proportions are significant, accurate identifications are often necessary. Recent advances in microchemical technique offer many opportunities for exact analysis which Mr. Hawley has neglected.

Mr. Hawley on the other hand, does not give any reason to justify the quantitative analysis of a composite sample, such as the mixture of material from all types of Pecos glaze upon which he reports. His qualitative tests showed that these glazes are essentially lead glasses with variable amounts of iron and manganese. It does not follow from this fact that there were not important changes in the composition of the glazes for the period of over three hundred

years during which they were produced. The archaeologist has long recognized marked differences in the appearance of early as compared with late glazes. He may well ask whether or not there was a consistent change in the fusibility of the glaze as determined by the lead-silica ratio, or by ratio of pigment to fluxes, and whether or not these changes are of such a nature as to indicate intentional modification of technique by the potter. Mr. Hawley's composite analysis does not answer these questions. This is an instance where quantitative determinations of material from definite types are justified. That such determinations are entirely practicable has been shown in a previous report.

Archaeologists will find Mr. Hawley's discussion of copper in glazes of the Little Colorado district of particular interest. This is, however, another instance where quantitative determinations appear to be justified. Although the Hawleys' methods and results are open to serious criticism, we cannot fail to recognize that they have made an important contribution to Southwestern archaeology by directing attention to the subject of pigment identification.

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## SOME RECENT PUBLICATIONS

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